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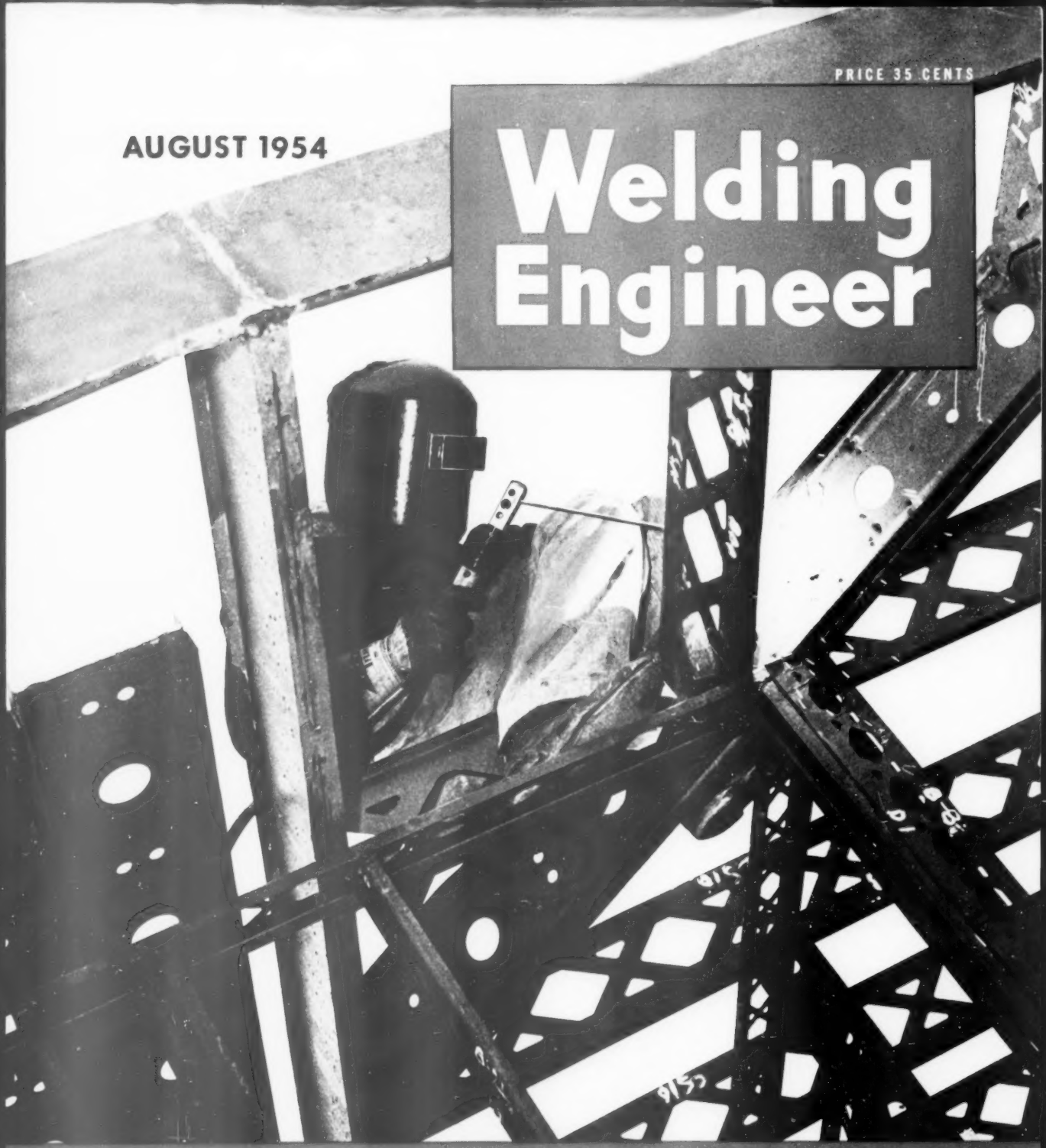
AUGUST 1954

Welding Engineer



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new

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For protection against falling objects and other sudden impact, and against bumping the head in close quarters, the new Jackson Safety Hats are a *safe* and *sound* investment.

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JACKSON CAP-AND-HELMET — TYPE SCH-1

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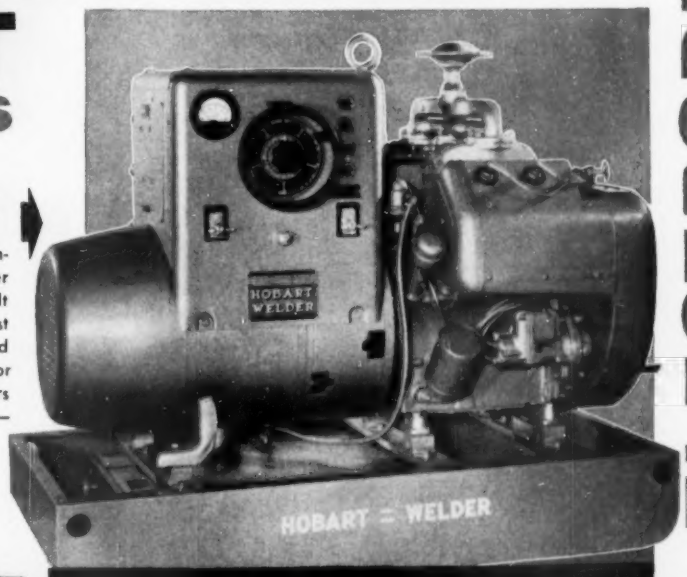

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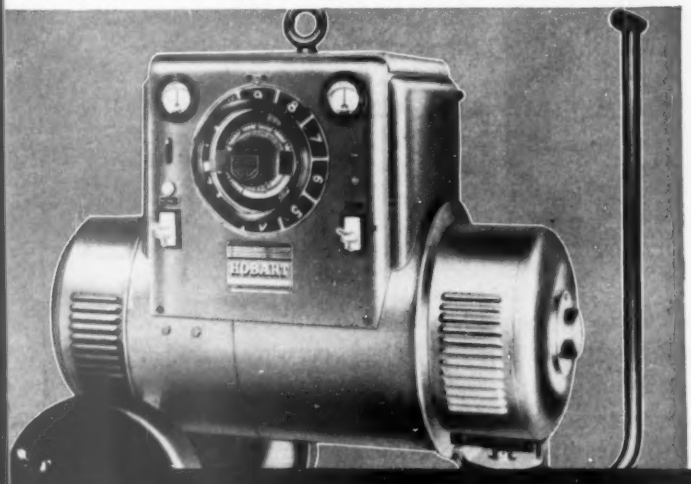

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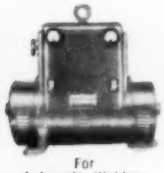
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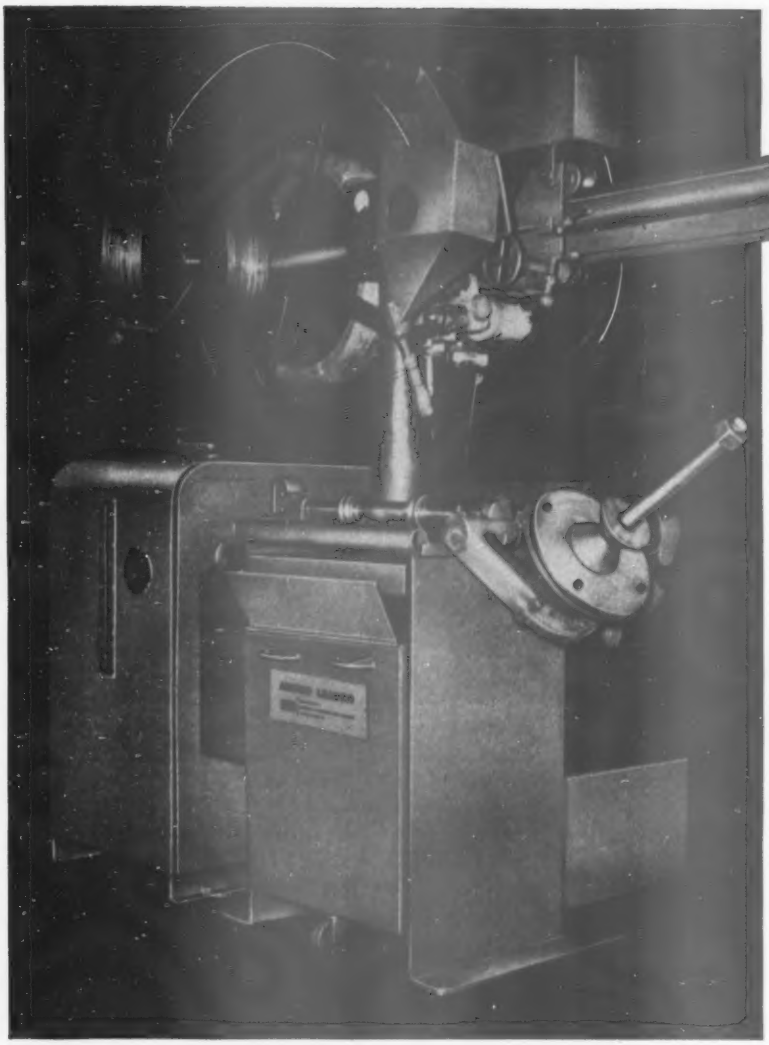

Here are facts about the great, new Amsco® Leader automatic electric welder

The Amsco Leader is a complete electric welding unit in one package. It is designed to combine all the essential needs of job shop operation, production manufacturing and automatic hardfacing in a single, efficient machine.

Easy handling of cylindrical, conical and flat work is made possible by a versatile, horizontal positioner.

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When you purchase an Amsco Leader, trained personnel will supervise installation and train your operators. They will also consult with you on production techniques whereby you may realize the greatest potential from this fine automatic electric welder. For additional information, contact your local Amsco Distributor.

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Chicago Heights, Ill.

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VOLUME 39 NUMBER 8

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AUGUST, 1954

Cover: Arc welding on steel-framed house of Lewis R. Berry at East Hanover, N. J.

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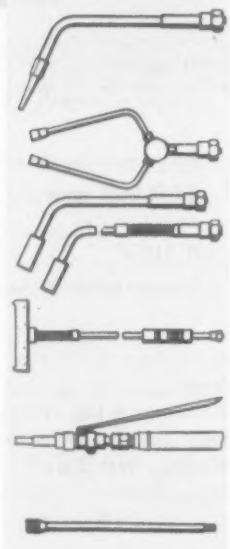
Cutting with VICTOR Model 300 Series Torch Butt and Model 2450 Cutting Attachment; cuts to approximately 8".

The versatility of VICTOR torches means you can buy exactly what you need for today's job, then add other nozzles, tips and attachments as required. Your equipment grows with your needs; stays custom-fit to your work. For example, here are a few of the 34 standard attachments for VICTOR 300 Series Torch Butts.

Start *right*. Buy the versatile VICTOR torch that grows with your job. See it at your VICTOR dealers *today* . . . or write NOW for Catalog 20.



Welding . . .
Here's one of 10 standard single-tip nozzles available for general welding and preheating.

Heating, Brazing . . .
You have your choice of 11 standard multiple-tip or multi-flame nozzles for preheating, brazing, silver soldering, etc.

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Save time and money with VICTOR attachments that fit your exact needs.

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OCCUPYING three flat cars, this 87-ton welded steel tower is 9 ft wide at base, will stand 151 ft high. It was shipped to a refinery

CHIPPER works in tight place—a stainless steel fractionator tower being built by Electric Boat Division, General Dynamics Corp.

NEWS

Close to 1,000 persons attend Spokane exhibit

NEARLY 1,000 persons attended the recent two-day welding exposition conducted by Gibson Welding Supplies, Inc., Spokane. Shown were the latest developments in welding, cutting and abrasive products.

In addition to the exhibit, a technical program, attended by more than 200 persons, featured papers presented by Professor Gilbert S. Schaller, University of Washington ("Some Causes of Weld Cracking"); Robert Hand, Stoody Co. ("The New Magnecote Process of Hardfacing"); Robert L. Wilcox, The Lincoln Electric Co. ("Electrode Selection and Its Effect on Welding Costs"); and E. B. LaVelle, General Electric Co. ("Analysis of Job Factors for Tungsten Inert-Arc Welding").

Motion pictures were shown at regular intervals, and tours were conducted of the Inland Oxy-Acetylene Co., an affiliate of Gibson.

* * *

Freighter has all-welded aluminum superstructure

THE largest ocean-going freighter ever built in Canada is said to be the first major merchant vessel to have an all-welded aluminum superstructure. The recently launched *S. S. Sunrip*, which is being built for Sun Steamships Ltd., will be chartered on a long-term basis to Saguenay Terminals Ltd., steamship subsidiary of Aluminum Co. of Canada, Ltd. (Alcan).

Designed primarily as a bulk carrier, the vessel's main function will be to carry alumina (aluminum oxide) from Port Esquivel, Jamaica, to the new Alcan smelter at Kitimat, B. C. In addition to the superstructure, the lifeboats, hatch boards, engine casings, furniture, stanchions, ladders, piping and funnel will also be made of aluminum.

* * *

Long crane is of all-welded steel

LONGEST crane ever built by The Cleveland Crane & Engineering Co., Wickliffe, O., has bridge girders that are of all-welded steel construction. The girders have an overall length of 141 ft and weigh 33 tons each. Capacity of the crane is 10 tons. It has been shipped to a large steel mill.

NWSA zone meetings

Here again are the 1954-55 zone meetings scheduled by the National Welding Supply Association:

Central zone: Sept. 16-17, Hotel Cleveland, Cleveland.

Eastern zone: Sept. 20-21, Sheraton-Plaza, Boston.

West Central zone: Nov. 15-16, Hotel Fontenelle, Omaha.

Southeastern zone: Dec. 6-7, Dinkler-Tutwiler, Birmingham.

Southwestern zone: Dec. 9-10, Hotel Skervin, Oklahoma City.

Western zone: Feb. 10-11, Fairmont Hotel, San Francisco.

The eleventh annual convention of the NWSA will be held from May 18 through 20 at the Edgewater Beach Hotel, Chicago.

IAA names program committee for 1954-55

NAMED by President E. A. Daniels to the International Acetylene Association's program, publicity and arrangements committee for 1954-55 were the following men:

T. C. Featherston, chairman, Linde Air Products Co., New York City; E. H. Roper, Air Reduction Co., New York City; Walter Bender, Shawinigan Products Co., New York City; J. F. Callahan, Air Reduction Co.; E. W. Axthelm, Linde Air Products Co.; F. H. Lewis, The Liquid Carbonic Corp., Chicago; P. E. Engler, The Balbach Co., Omaha; F. R. Fetherston, Compressed Gas Association, New York City; H. A. Goodwin, The Bastian-Blessing Co., Chicago; T. B. Jefferson, editor of WELDING ENGINEER; L. P. Aurbach, *Industry & Welding*, Cleveland; J. G. Magrath, American Welding Society, New York City; C. D. McGuinn, National Cylinder Gas Co., Chicago; L. C. Monroe, *Welders' Digest*, LaPorte, Ind.; C. M. Pitts, The People's Gas Supply Co., Ltd., Ottawa; O. M. Randel, Independent Engineering Co., Inc., O'Fallon, Ill.; H. S. Sutherland, Shawinigan Chemicals, Ltd., Montreal; J. F. Wagner, The Burdett Oxygen Co., Cleveland.

* * *

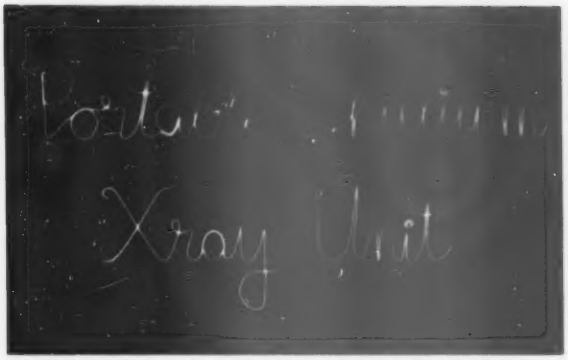
Eutectic produces sales training film

"EFFECTIVE servicing" is the theme of a 25-minute, 16-mm film entitled "A Day with a D. E.," which has been produced by Eutectic Welding Alloys Corp., Flushing, N. Y. The story line tells of a typical day in the life of a district engineer.

The film was prepared by a group of sales and service specialists, and it is designed to reduce the long training period necessary to indoctrinate an engineer into policies, procedures and materials of the firm.

NEWS

from page 5



THULIUM was used to radiograph this solder lettering

SAFETY award is presented to Union Carbide & Carbon

Radiothulium–new tool for weld radiography

A PORTABLE X-ray unit developed at Argonne National Laboratory, near Chicago, that makes use of a thulium-170 source (and which was the subject of a news item in the June issue of WELDING ENGINEER) has been described in a recent issue of *Nucleonics*, a McGraw-Hill publication.

The thulium (element 69—one of the rarest of rare earths) is irradiated in the materials-testing reactor, then inserted within an aluminum capsule that is welded shut. This capsule fits inside a lead shield that protects personnel from radiation. A photographic cable release controls source position inside the shield and moves the source to the exposure position. This simple, portable unit weighs less than 7 lb.

Such equipment has great value in isolated locations such as small naval vessels and construction camps where only small-scale power is available. Half of the radiothulium converts to inactive isotopes every 129 days. When it decays, however, it can be sent back to the laboratory to be reactivated. In this way, useful life of the source for radiography is lengthened.

Radiations from thulium are said to have a penetrating power comparable to those from a 100-kv X-ray tube. Thulium radiations should be most useful in the range of thickness up to 1 in. of steel or 3 in. of aluminum. Radiographs of very thin sections are deficient in contrast.

The author of the *Nucleonics* article, S. Untermyer, of Argonne, declared, "It is well to dispel the notion that such equipment might supersede conventional X-ray tubes . . . X-ray tubes provide far greater intensity and permit ready adjustment in radiation energy to suit the applications. On the other hand, thulium sources appear to produce radiographs of a quality that is acceptable for many purposes, and they can be used in locations where standard X-ray facilities could not easily be made available."

* * *

ASME paper discusses aluminum alloys 3S, 61S

THERMAL diffusivity of two aluminum alloys—3S and 61S—commonly used for welding purposes shows little or no increase with temperature between 150 and 1,000 F. This conclusion, of practical importance in welding aluminum, is the result of a new experimental procedure and instrumentation developed for metals of relatively high thermal diffusivity. It was given before The American Society of Mechanical Engineers at the recent semiannual meeting in Pittsburgh by D. Rosenthal and N. E. Friedmann, of the University of California.

The method of moving heat sources and experimental procedure for high temperatures is rapid and direct, the authors stated, and figures were easily determined to three significant places. Precision was estimated to be 2% on the basis of several consecutive runs, but since six consecutive runs can be made within two or three hours, the attainment of required precision is believed to be practicable. A complete, illustrated description of the experimental equipment and procedure was presented, including a discussion of results and such factors as hardening, alloying elements and the attainment of the quasistationary state.

Copies of the paper, No. 54-SA-56, may be obtained at 50 cents each from Order Dept., ASME, 29 W. 39th St., New York City 18, N. Y.

Union Carbide earns safety award

AN AWARD of Honor for its safety accomplishments during 1953 was recently presented to Union Carbide and Carbon Corp., New York City. The award is made for improvement in frequency and severity rates below par rates established by the National Safety Council. During 1953, the accident-frequency rate for the firm's employees was 3.6 disabling injuries per million man-hours worked. This is 73% below the similar rate for all United States industries. Union Carbide's individual companies have earned the award in previous years, but this is the first time the corporation as a whole received it.

In above picture, Ned Dearborn (right), president of the National Safety Council, is presenting the plaque to Morse G. Dial, president of UCC.

* * *

Navy Experiment Station celebrates 50th Year

IN commemoration of its 50th anniversary, the U. S. Naval Engineering Experiment Station, Annapolis, Md., conducted a two-day open house June 25-26. Governor Theodore R. McKeldin was one of the pricipal speakers.

The public was invited to visit the Station to view various exhibits and tour the laboratories. Welding exhibits included every conceivable metal and process used today. Art and display work for the exhibit was done by employees of the Station. Of particular interest was a display of tools and equipment made centuries ago by prehistoric man.

From a modest beginning with one small building, the Engineering Experiment Station has grown to a 59-acre site with seven major labora-

(Continued on page 78)

here is an additional line every welding supply distributor can handle profitably

whether or not you are now handling our line of welding and flame cutting apparatus these many air-gas torches will be of interest to you and can be handled by you at a desirable profit. Our brochure No. 8 illustrates and describes equipment which is noncompetitive but supplementary.

Is natural gas scheduled to replace a manufactured gas in your territory? If so, we have something of special interest to you and your Gas Company. If this conversion has been made in the past, we have equipment your customers will be interested in. We have designed, produced and used torches and other items for the control of flammable gases since 1910; and we have cooperated with gas manufacturers and public utility companies for many years. Please look at the column to your right for a partial listing of some of the torches our brochure illustrates and describes in a colorful and interesting manner . . . **write for it today**

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air-gas mixers for many purposes and in all capacities . . .

fine needle valves in all sizes . . .

a modern alcohol blowpipe for glazing, heat treating of molding compounds, smoothing wax surfaces or working with plastics . . .

cannon fires which can use many fuel gases with air or oxygen . . .

small air-gas torches for hand or bench use . . .

preheating torches in all sizes and capacities . . .

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NEMA-rated at 200 amps.

—but pulls 300 amps.!

Runs all day on one tank of gas!

New P&H WN-250 Engine-Driven

Here you get everything you've ever wanted in an engine-driven welder — including features you don't get from any other.

Take a quick look at some of the WN-250 advantages that help you keep step with demanding production schedules; help you cut costs:

(1) The P&H WN-250 has more capacity than other welders with the same rating.

(2) It has a full 20-gallon gas tank.

(3) It gives you the latest-type P&H welding generator, powered by a direct-connected gasoline engine. It's a four-cylinder, 180GLU Waukesha, water-cooled and built for heavy duty. And we really mean *heavy* duty — it's not an automotive light-weight. Available with electric starter.

(4) The WN-250 is equipped with a P&H idling device that establishes the rated speed of 1800 rpm as soon as the arc is struck. This speed is maintained for a set period after the arc is broken.

(5) It has P&H's famous Dial-lectric Control. An easy turn of a radio-type knob provides stepless heat adjustment over the entire high or low range.

(6) It has pre-lubricated bearings, to reduce the need for servicing and insure longer life.

(7) It has an auxiliary AC power supply (1KVA) that permits floodlighting and running power tools, while welding.

There are other reasons why you're money ahead with a P&H WN-250. Ask your P&H representative or distributor for all the facts. Or, write for bulletin.

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Both engine and generator are mounted on a sturdy frame. Two-wheel mounting also available.

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America's most complete line of Arc-welding equipment and electrodes

Continuous 8-hour welding test demonstrates the extra stamina of the P & H WN-250

You can't beat welding performance like this: In a recent test, the P&H WN-250 operated continuously for 8 hours on a 70% duty cycle.

A 5/32" electrode was used with 300 feet of cable. There were 250 amps. at the electrode. So that the test would be continuous, three welding operators were used. When one got tired, another took over. All used the drag technique with a 6010 rod — which is as close to a short circuit as you can get.

At the end of 8 hours, the P&H generator was still cool. And the WN-250 was still rarin' to go — the weldors were worn out, but not the machine.

P&H AC WELDER

A full range of sizes up to 625 amps. (NEMA-rated). All are connectable to 220 or 440 volts. Dial-lectric Instantaneous Remote Control is fingertip control — gives you any heat you want—right at the work.

P&H DC RECTIFIER WELDER

Three sizes — 200, 300 and 500 amps. (NEMA-rated). No moving coils — no bearings, brushes, commutator, brush riggings, etc. Dial-lectric Control gives you finger-tip heat-control at the work.

P&H POSITIONERS

One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote control and hand operated models.

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A type and size for every job — to give you cleaner, sounder welds at lower cost on mild steel, cast iron, "hard-to-weld" steels, stainless steels, or hard surfacing.

P&H Welding equipment is manufactured and sold in Canada by

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WELDING ARCS NEWS
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SELF-REGULATING GENERATOR—you set arc length only once and current automatically adjusts for any wire-feed speed.
GUN PULLS WIRE, permits use of smaller wire to weld thinner sections.
REMOTE, WIRE-FEED CONTROL conveniently located at operator's fingertips.

FILLERARC IS THE ONLY COMPLETE EQUIPMENT DESIGNED ESPECIALLY FOR CONSUMABLE-ELECTRODE GAS-SHIELDED WELDING

Now—demand for these Fillerarc* features permits G.E. to reduce price 15 percent

Production economies resulting from heavy customer demand, and use of expanded manufacturing facilities at General Electric's new plant at York, Pennsylvania now make possible a 15% reduction in the price of Fillerarc equipment.

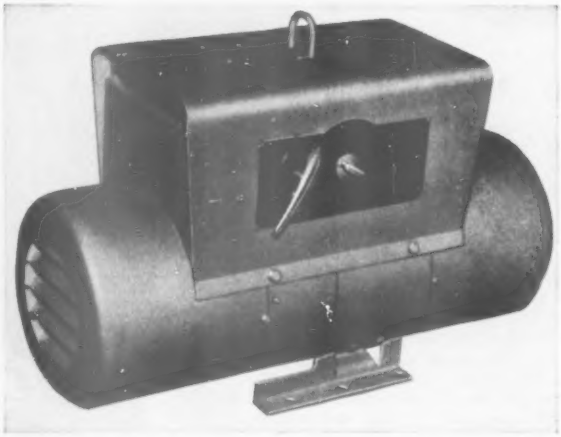
GENERATOR NOW AVAILABLE SEPARATELY

Also, you can now get the Fillerarc generator as a separate equipment. This self-regulating unit automatically supplies the right current to consume the amount of wire being fed. Once you set the arc length, current is correctly adjusted for every change in wire-feed speed.

CONTACT YOUR DISTRIBUTOR TODAY

Ask your nearest G-E welding distributor today for free bulletins on Fillerarc equipment. His name is listed on the opposite page and in the yellow pages of your phone book, under "Welding Equipment—General Electric." General Electric Co., Schenectady 5, N. Y.

*Registered trade-mark of General Electric Company.



G-E FILLERARC GENERATOR, now available as separate equipment, is the only generator with a rising volt-amp output characteristic. This minimizes burn-back, stubbing. For best performance with any consumable-electrode, gas-shielded equipment use this G-E power source.

TEST COMPARISON is made by Tractomotive Corp. employees between welds made with Strikeasy 1 and E-6012. Strikeasy 1 electrode welded 2 to 3½ times faster.

Tractomotive uses G-E Strikeasy 1 . . . increases welding speed 2 to 3½ times

General Electric powdered metal electrode is rapidly accepted by industry

Faster deposition rates . . . less operator fatigue . . . self-cleaning feature—these advantages of G.E.'s Strikeasy 1 contact electrode are being acclaimed by industry.

SAVE WITH STRIKEASY 1

The Tractomotive Corp. of Deerfield, Illinois has realized all these benefits of Strikeasy 1 in the welding of crawler tractor assemblies.

Says Tractomotive's general welding superintendent, S. E. Huffman, "Strikeasy 1 is that wonder electrode we've been needing for a long time. It's fast, practically self-cleaning and it produces a fine-quality weld. That means money saved, a boost in production, and a better all-round job."

USE FOR HIGH-SPEED JOBS

Strikeasy 1 conforms to AWS specifications for E-6012 electrodes in the flat and horizontal position.

Use Strikeasy 1 for those applications where the important factor is higher production speed. With this powdered-metal electrode, Tractomotive operators produced 21 inches of $\frac{3}{8}$-inch fillet weld in 1½ minutes. The conventional E-6012 electrode filled the same length weld in 7½ minutes.

TEST STRIKEASY 1 ON YOUR JOB

Try Strikeasy 1 on any job where you are now using E-6012. See how it can speed up production and still produce the quality of weld you need.

For detailed information on this new standard in high-speed electrodes, see your nearest G-E welding distributor. His name and address are listed at the right.

710-18

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Nebraska: Lincoln—Lincoln Welding & Suppiy; Omaha—Baum Iron

New Jersey: Kentlworth—Weldir ; Sales Corp.

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North Carolina: Charlotte—Dixie Gases; Gastonia—Gastonia Motor Parts

North Dakota: Bismarck, Fargo—Acme Welding Supply

Ohio: Akron, Cincinnati, Cleveland, Columbus, Dayton, Mansfield—Burdett Oxygen; Toledo—Odland Iron Works

Oklahoma: Oklahoma City—Hooper Supply

Oregon: Eugene, Portland—J. E. Haseltine; Medford, Portland—Industrial Air Products

Pennsylvania: Allentown, Philadelphia, Pittsburgh—Arcway Equipment

South Carolina: Columbia, Greenville—Welding Gas Products

South Dakota: Deadwood—Hendrie & Bolthoff

Tennessee: Chattanooga, Knoxville, Nashville—Welding Gas Products; Memphis—Delta Oxygen

Texas: Abilene—M&M Welding Supply; Alice, Corpus Christi—Crane Welding Supply; Alpine, El Paso, Marfa, Pecos—Car Parts Depot; Amarillo—Welding Equipment & Supply; Beaumont—H. & W. Welding Supply; Brownsville, Harlingen—Acetylene Oxygen; Dallas—Hill Equipment & Supply; Houston—G-E Welding Sales Division; Lubbock—Welders Supply of Lubbock; Midland—West Texas Welders Supply; Odessa, Pecos—Western Oxygen; Orange—Marine & Petroleum Supply; Pecos—Welding Supply Co.; Plainview—Plains Welding Supply; San Angelo—Southwestern Welding Supply; Texarkana—Hughes Oxygen; Wichita Falls—Nortex Welding Supply

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NEW DESIGN MAKES THEM BETTER 6 WAYS

Patents Pending

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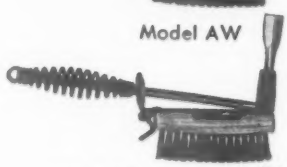
Model AW



Typical Atlas ruggedness and quality are built into these redesigned weld cleaning tools to make them doubly important in improving quality and volume of production.

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Welders like their balance and "feel"—will like these new models better than ever.

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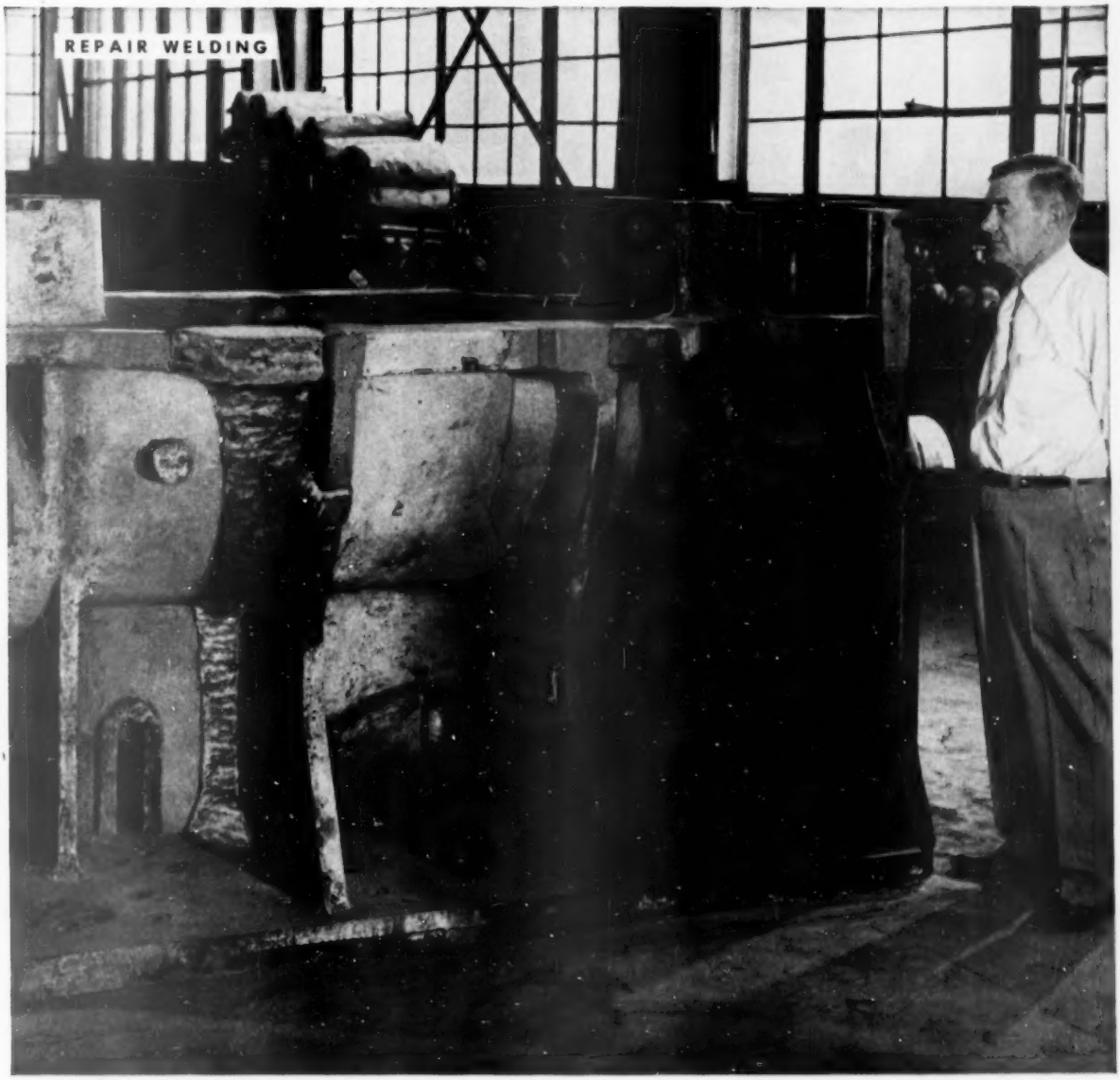

"Don't scrap it . . . braze-weld it" paid off handsomely when this inner ram was twice repaired.

Braze welds twice save press part from scrap heap

This is the inner ram of a 500-ton press for shaping automobile fenders, quarter panels, floors, etc. It weighs 10 tons.

Twice it cracked, in different places. And twice braze-welding repaired it. It would have cost thousands of dollars to replace this part.

Punch Press Repair Corp., 1975 Hilton Road, Ferndale 20, Michigan, did both jobs. Each time they used Tobin Bronze*-481 Welding Rods. They say, "Welding with Tobin Bronze saves us time. It's economical and dependable, too. Braze welds need less preheating . . . high stresses don't build up. Tobin Bronze flows freely, 'tins' quickly, gives strong, sound bonds."

Tobin Bronze-481 Welding Rod is widely used for repair welding of cylinders and other locomotive parts . . . automobile engine blocks . . . cast-iron pipe . . . machinery parts and other equipment.

ANACONDA Welding Rods for *many* types of repair and production jobs are available from distributors throughout the United States. *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.*

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AnacondA Copper-372 • Tobin Bronze-481 • AnacondA-997 (Low Fuming) Bronze • Nickel Silver-828 • Cupro Nickel-826 • Everdur-1010 • Ambraloy-928 • Phosphor Bronze-351 • Phosphor Bronze-354

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With Lincoln Agglomerated Fluxes, alloys are physically bound in the flux and can be produced and sold at lower cost than when introduced by other methods. One pound of Agglomerated Flux covers 30% more area than conventional material. The results are further reductions in costs.

Complete Application Service

Lincoln hardsurfacing specialists are in every key industrial city. Call or write for latest cost cutting information.

WHY PAY HIGHER PRICES FOR HARDSURFACING?

LINCOLN "Abrasoweld" and "Faceweld" electrodes sell for ⅓ the price of other hardsurfacing rods for comparable service. Yet, you still get *high alloy content . . . top resistance* to impact and abrasion. Here are the reasons:

1. Incentive-inspired Lincoln mass-production methods and mass-distribution are effecting tremendous savings . . . savings passed on to you.

2. Nine out of ten jobs are handled with *only two* Lincoln rods . . . "Abrasoweld" and "Faceweld" to simplify inventory and cut your costs.

So why pay the higher prices? Make a comparison yourself . . . save 30 to 50% with Lincoln hardsurfacing.

FREE HARDSURFACING GUIDE

Bulletin 469 shows how to simplify maintenance . . . available by writing . . .

Saves 39% *by production hardsurfacing of scraper blades using automatic Lincolnweld with Twinarc and Spreadarc. Service life . . . 3 times longer.*

At right: Flexibility of manual hardsurfacing is combined with the speed and ease of automatic hardsurfacing with Manual Lincolnweld using Agglomerated Fluxes.

THE LINCOLN ELECTRIC COMPANY

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THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

ESTABLISHED 1916 **Welding Engineer** AUGUST, 1954

A tale of three cities

TEN YEARS ago an editorial on this page entitled, "Shall we stand alone?" discussed the advantages and disadvantages of a separate welding meeting and show. Apparently, we were premature. Though some people agreed with us, many influential figures in the welding industry did not.

Our 1944 editorial named these advantages:

"(1) It would be an exclusive welding meeting and would be known as such instead of just being a part of a larger gathering; (2) AWS might do better financially than it does under the present arrangements; (3) the comparatively small attendance would mean that the welding meeting could be taken to smaller cities like St. Louis, Milwaukee, Buffalo, Boston, Atlanta, Cincinnati, Birmingham, Kansas City, Minneapolis and San Francisco; (4) though the welding exhibits would be viewed by only eight to ten thousand people, each of them would undoubtedly be more interested in welding; (5) AWS members holding memberships in other societies now participating in the Metal Show would be able to attend the annual meetings of these societies without conflict.

"Point 3 deserves a few more words. The Metal Show has grown to such a monstrous size that there are now only four cities—Chicago, Cleveland, Detroit and Atlantic City—which have facilities where it can be staged. All of these cities are 'sick of conventions'—at least that is the impression one receives when trying to secure accommodations. Smaller cities might be more happy to welcome us, and undoubtedly we would receive more publicity in the local press."

SO MUCH for 1944 thinking. Before you start jumping down our throats, we'll confess we were in error in overlooking Philadelphia, where two very good Metal Shows have been held of recent years. Our profound if somewhat belated apologies to the Quaker City. Apart from Philadelphia, however, the truth of what we said in 1944 has not altered. But the mental climate of the welding industry has changed considerably.

The 1944 editorial brought down a shower of brickbats on its writer's head. But who doubts now that the separate welding show is a good thing? That battle has been fought and won. It looks very much as though the separate welding show is here to stay—at least as a secondary if not the principal event of the welding year.

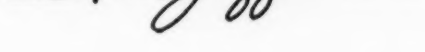
WITH APOLOGIES to Charles Dickens, we have here "A Tale of Three Cities."

City No. 1 is Houston, where the first all-welding welding show was held in 1953. It was staged under some rather adverse conditions, including a heat wave, and a few exhibitors grumbled about the limited attendance. All things considered, though, the separate show was off to a good start.

City No. 2 is Buffalo. There have been only glowing reports of this affair of last May. "Well worthwhile." "We were talking to customers." "The best welding show ever held" . . . these are some of the statements your editor overhead. If there was any unfavorable comment, it escaped his attention.

City No. 3 is Kansas City, Mo., where the 1955 spring technical meeting and welding show will be held in the early part of June. Some may be inclined to criticize this choice of meeting place on the grounds that it is a move to "the sticks." Nothing could be further from the truth. While some cities may equal the Missouri metropolis, none will be found to excel it from the standpoints of exhibition facilities and hotel accommodations. And Kansas City is centrally located. Though New Yorkers may have to pay a bit more to travel there, the people on the West Coast will be getting a break.

Jet engines and aircraft, automobile assembly, auto body building, electronic tubes, steel fabrication, railroad equipment, oil refining . . . these are among the many industries located in the Kansas City trading area. The people of that area represent a segment of real purchasing power in the welding market. Perhaps even that "hard-to-beat" Buffalo performance will be surpassed next year in Kansas City.



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VICTOR hardfacing alloys save you time and money with faster application, smoother deposits, longer wear!

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VICTOR for welding

Profitable dealerships open; inquire now!

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THIS HARD-FACING ROD	FOR THESE CONDITIONS	FOR THIS EQUIPMENT	APPLI-CATION
VICTORTUBE	Severe abrasion	Scarifier teeth, dredge cutter blades, posthole augers, oil field tools, ditcher teeth	Acety. AC-DC Elec.
VICTORTUBE "SPECIAL"	Abrasion, severe impact	Oilfield bits, rock bits	Acety. only
VICTOR TUNGSMOOTH	Thin cutting edges	Coal cutters, brick augers, pug mill knives, screw conveyors, farm tools	Acety. AC-DC Elec.
VICTORITE	Earth abrasion or sliding friction	Plowshares, cultivators, steel mill guides, cement chutes, shaft bearings, rolling mill guides	Acety. AC-DC Elec.
TUBE VICTORITE	Abrasion, impact	Plow points and farm tools	Acety. AC-DC Elec.
VICTORITE 1	Corrosion, heat, abrasion	Saw teeth, carbon scrapers, wire guides, rocker arms, steel mill applications	Acety. AC-DC Elec.
VICTORITE 6	Red heat, impact, corrosion and abrasion	Blanking, forming and trimming dies, cams, hot punches, pump shafts	Acety. AC-DC Elec.
VICTORITE 12	Heat, abrasion, impact	Saw blade inserts and other critical applications	Acety. AC-DC Elec.
VICTORITE CARBON ARC	High abrasion, thin deposit	Plowshares, lister shares, sweeps	Carb. arc Acety.
VICTORALLOY	Abrasion, severe impact	Tractor rollers, dredge pump impellers, bucket lips and teeth, rock crushers, steel mill wobblers, roll crushers	Acety. AC-DC Elec.
VICTORALLOY #1	High abrasion, medium impact	Bucket lips, rock crushers, Muller tires, gyratories	Acety. AC-DC Elec.
VICTORALLOY "A"	Angular shock, extreme impact, build-up	Clutch parts, gears, crusher plates, gyratory mantles, build-up for hardfacing	AC-DC Elec. only
VICTORALLOY "B"	Heavy impact, moderate abrasion	Tractor rollers and sprockets, shovel pads, plates, idlers, etc.	AC-DC Elec. only
VICTORALLOY "C"	High abrasion, moderate shock and impact	Tractor grousers, pressure rolls, crusher segments, roll crusher teeth	AC-DC Elec. only

Also VICTOR Bulk Metals, VICTORITE Plow Point Bars, and VICTOR Super-Titan Blasting Nozzles

For Automatic Application

THIS TYPE	FOR THESE CONDITIONS	ON THIS KIND OF EQUIPMENT
VA #1	Abrasion, medium impact	Crusher rolls, crushers, gyratory crushers
VA #2	Abrasion, impact, Multi-pass application	Steel mill applications
VA #3	Abrasion, light impact	Mill guides, crushers, dredge bushings
VA #4	Multiple layer build-up	Tractor rails, crane wheels, general build-up
VA #5	Heavy impact, abrasion	Tractor rollers, idlers, mine car wheels, sheave wheels
VA #6	Medium abrasion, high impact	Crane wheels, drums, roll necks
VA #7	Abrasion, high impact	Build-up for hardfacing
VA #8	Abrasion, medium impact	Dozer bits, roll crushers, scraper blades
VT #60	Extreme abrasion	Tool joints, grader blades, scraper blades, augers

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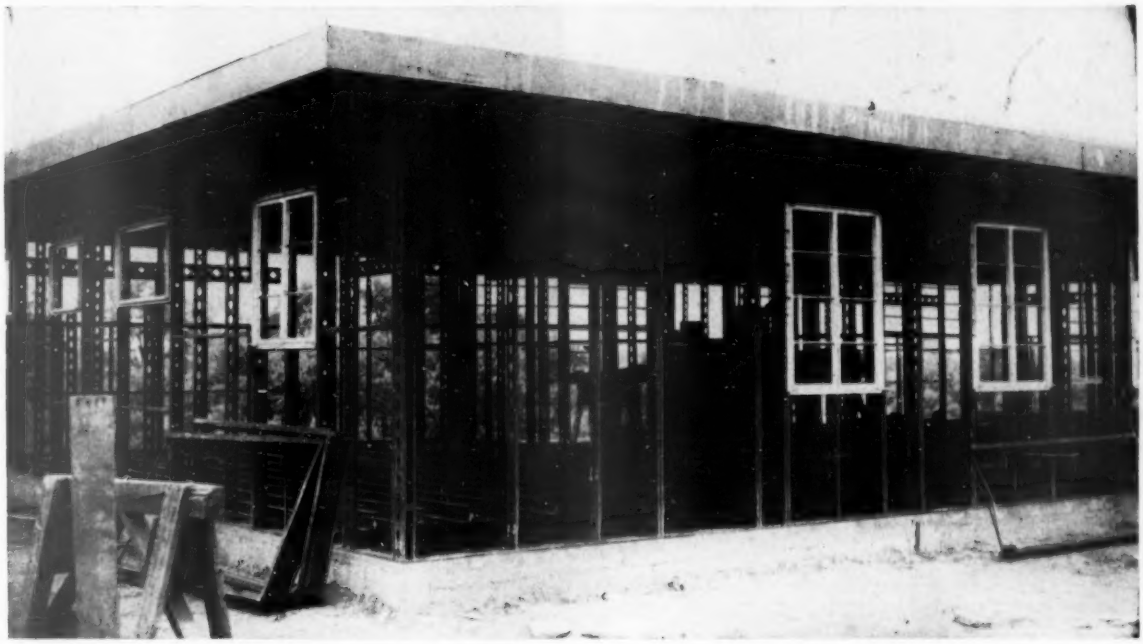


FRAMEWORK of Lewis Berry's new home at Hanover, N. J. was built from lightweight structural steel sections

It's here! A welded steel home

With the population curve continually turning upward, the building of badly needed housing is one of the gravest problems confronting the American people today. The man who buys or builds a house has to pay through the nose for the privilege of being a homeowner. But houses don't need to cost so much if modern methods are followed.

BY CLYDE B. CLASON

BY USING lightweight steel sections, welded together at the shop and on the site, it's possible to build a newer, more desirable home and at the same time slice an appreciable amount from the construction costs.

A pioneer in this direction is Lewis R. Berry, president of the East Orange Lathing Co., East Orange, N. J., who is building a seven-room home at an attractive country site in East Hanover, N. J. Though this will be a "luxury" home in every way, the expenditure for materials and labor is very moderate. Mr. Berry estimates the cost of construction at about $10 a square foot. Under conventional building methods, the cost would be about $13.50 a square foot.

Let's get a better look at the new Berry home. Its framework is welded steel—exactly like a skyscraper except that sections of much lighter weight are used. On the inside and outside flanges of the studding for the wall panels, 3/8-in rib expanded metal lath is tied. The 2½-in. cavity between the interior and exterior walls is filled by blowing in an asphalt emulsion containing fiberglass and asbestos, which acts as a vapor seal. All pipes and wires are sealed in the structural walls.

The exterior lathe is covered by two coats of Portland cement, over which goes a finishing coat of Oriental stucco in an attractive coral pink. The inside walls and ceiling receive three coats of hard white plaster.

A Fireproof Home

For the roof, a 2½-in. wood fiber cement insulating board is nailed or clipped to the surfaces of the ceiling joists. This deadens all sound and has the same insulation value as its equivalent thickness in rock wool. Over this decking a 5-ply roof is built up of asphalt paper and hot tar. The roof is completed by a gleaming layer of white mineral chips.

Mr. Berry's finished house will be fireproof, rotproof and termiteproof. It should last indefinitely, with low maintenance costs. And the construction is flexible. This is no mass-produced house turned out by the thousands on an assembly line. It was built to the owner's own specifications and to the drawings of his architect, George T. Hechtel, of Irvington, N. J.

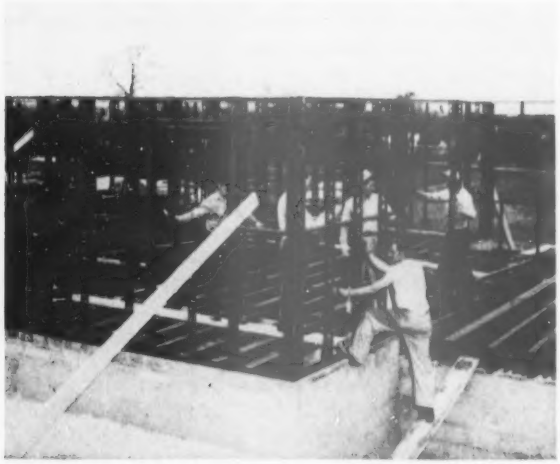
A ranch house of the California type, the Berry home has its seven rooms on a single floor with overall dimensions of 62 by 36 ft. The large living room is 20 by 28 ft and has a brick wood-burning fireplace. There are three bedrooms 12 by 16 ft and one bedroom 8 by 10 ft. The kitchen

PANELS for walls and partitions were laid out in the welding shop at Newark by a two-man crew

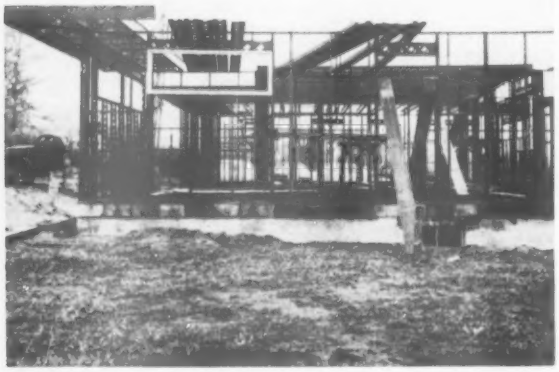
STUDS and the bridging members between them were welded together in accordance with architect's plans

FLOOR joists are in place atop the foundation wall. Note steel plates under joists for leveling

WALLS and partitions start to go up. A truck crane at this stage would have speeded construction



NOTHING to it! Every panel goes into its proper place without cutting or refitting. Then it's welded



NEXT step is to lay the roof joists. Overhang shown on the left runs all the way around the house

is 14 ft by 9 ft 6 in., dining area is 14 by 12 ft. The house has two bathrooms: one 5 ft by 9 ft and the other 10 ft 2 in. by 7 ft 8 in. There are three closets 4 ft 2 in. by 4 ft 8 in., two linen closets, a guest closet and two small utility closets. It seems unlikely that the owner and his family will ever be cramped for space.

There is a full-size basement, part of which is devoted to a greenhouse under the front porch. In a glassed-in space of 21 ft by 7 ft 6 in., Mr. Berry will be able to pursue his favorite hobby of growing plants. The car port is in the rear of the house.

For outdoor living, there is a front porch 21 ft 6 in. by 11 ft 7 in. and a rear porch 16 ft by 8 ft. These are roofed by a 3-ft overhang, which has a stucco soffit and a 10-in. aluminum facia plate all the way around the house. The sliding sash windows in the bedrooms and baths are aluminum-framed. Except for the overhanging roof, there are no protruding trims anywhere in this house. The base is flush metal, and the windows are corner beaded on four sides.

Temperature Control System

The heating plant is another modern feature. There is a thermostat in every room so that every member of the family can enjoy the exact temperature he or she prefers. The individual heating units quickly respond to changes in outdoor temperature, in wind direction and velocity and to indoor heat resulting from sunlight, fireplace, cooking oven, and even the radiation of human bodies.

This new heating system, just released for national distribution by the Iron Fireman Mfg. Co., Cleveland, utilizes low-pressure steam, supplied to the individual room units by small flexible copper tubing. Each room is heated with filtered warm air, circulated by a fan in a wall recess. There are no radiators, and the central heating plant is no more than a small boiler in the basement. The thermostats regulate both the speed of the circulating fans and the steam supply, modulating the heating units from 1/20 of capacity to full capacity to maintain the selected heat level. Each thermostat may be set at any temperature from 40 F to 90 F. They are non-electric and require no wiring.

Copper tubing will be used throughout the house, for plumbing as well as heating.

It is little wonder that Owner Berry takes pride in showing you through his home to be. A king or a millionaire could live no better.

At the time of the writer's visit, the walls were not up but all of the steel work had been completed. Only a few basic types of structural sections are used: joists, studs and channels. These are manufactured by Penn Metal Co., Inc., New York City, for custom framing in the light building field. They have been used rather extensively for schools, hospitals, light industrial plants and commercial enterprises, but the company is just beginning to enter the residential field. Mr. Berry's house is the first of its kind to go up along the Atlantic Seaboard.

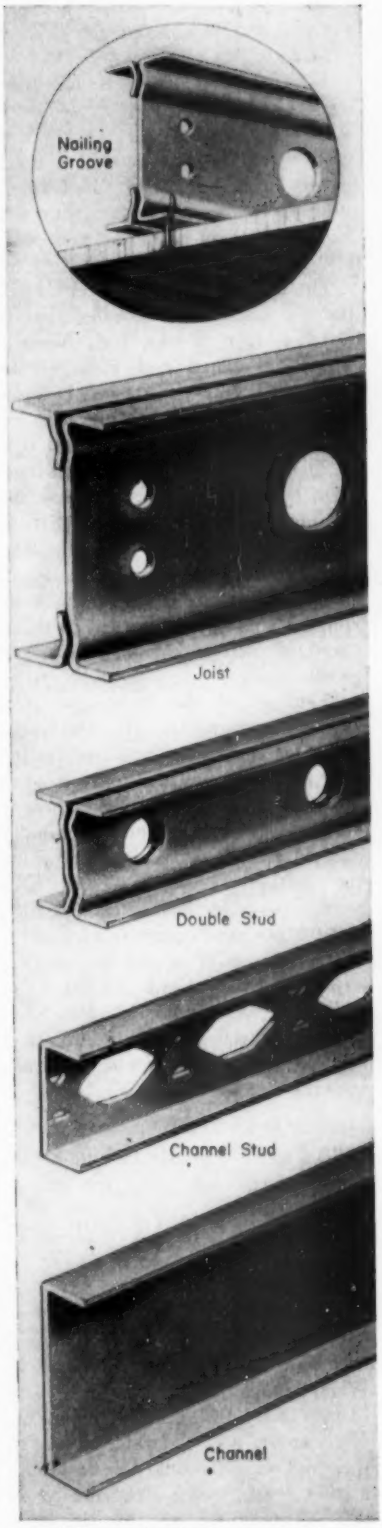
Structural Steel Sections

The picture on the right shows the construction of the four principal types of structural sections. The joists, the heaviest members, are used to support the floor and the roof. Mr. Berry used joists of 14-gage steel, 10-in. depths for the floor, and joists of 14-gage steel, 8-in. depth for the roof.

For the wall studding, channel studs 3⅝ in. deep were specified. These members are of 16-gage steel and are manufactured in five depths, with either punched or solid webs. The punched studs, which Mr. Berry employed almost exclusively, lessen the weight of the wall panels and interior partitions and conserve steel.

Around the windows, 3⅝-in. double studs were used. Each of these consists of two irregular channels spot welded back to back to provide a nailing groove between them. Any wooden section such as a window frame can be readily nailed to the steel through this groove.

Track and bridging sections are manufactured to fit each size of the joists, studs and channels. Track sections are sized to fit over the flanges, and bridging sections to fit inside the flanges. In Mr. Berry's home, the bridging sections were employed to serve as horizontal stiffening members between the wall frames and to provide supports for window frames. Bridging was also necessary between the joists for floor and roof. The track sections were used to obtain continuous top and bottom anchorage for the exterior walls and interior partitions. Unpunched track sections



HERE are the basic structural sections: joists for floor and roof, double studs and channel studs for walls and partitions. Channels (unpunched) may be used as either studs or joists

running entirely around the house at top and bottom close all the exposed joist ends.

With these conveniently designed steel sections, putting up the framework of a house is like playing with a boy's Erector set. The steel sections, in the required sizes, are simply shipped to the fabricator, who cuts and welds them to fit the architect's blueprints.

The fabrication of the steel for Mr. Berry's home was handled by B. Katchen Iron Works, Inc., Newark, which is owned and managed by Louis and Harry Katchen. In spite of the fact that this was the first job of its kind ever tackled, and all jigs, tooling, etc., had to be designed from scratch, the fabrication and erection of the entire project took less than 40 man-days, according to Louis Katchen. For mass-production houses of this type, a great saving in construction costs could be achieved by using standard jigs to fit standard wall panels.

Welding of the light-gage steel posed some problems. The iron works was not accustomed to weld such thin material, and a few pieces were burnt by trial welds before the proper current setting was found. Using a current of 40 to 50 amp and 220 volts, the sections were shop and field welded without any particular difficulty. The steel company now advocates the use of a 110-volt welder, saying that 220 volts is too hot.

Cutting was accomplished by sawing. Here the light weight of the steel sections proved to be a decided advantage in speeding fabrication.

Shop and Field Welding

Two men—a weldor and the helper—assembled each panel for an exterior wall or interior partition on a jig. The jigs were simply pieces of structural steel, to which proper locating stops were welded to fit the requirements of each panel. The panels varied in size from 8 by 8 ft (smallest) up to large panels of 18 by 8 ft. When completed, they were trucked to the site and erected manually. Here, again, a considerable saving in time and expense could be effected by a truck crane, which was not used on this job. Even without this aid, however, the steel went up pretty fast.

As soon as the sections were in place, they were arc-welded together, using a portable gas-engine-driven welder with the same current setting of 40 to 50 amp. Electrodes used were ⅛-in. diameter AWS E-6012 class, for both shop fabrication and site welding. Erection of the prefabricated panels took only a few days.

How House Went up

First, the floor joists were laid on top of the low concrete retaining wall. Steel leveling plates were placed underneath them, but the joists were not anchored in any way to the concrete. The joists were spaced 16 and 24 in. apart, and bridging sections were installed between them to provide lateral bracing before the application of the construction loads. Double joists were placed underneath the location of each interior partition running parallel to the joists. At the ends of panels, the joists were braced laterally by anchors or ties at each line of bridging.

Specifications followed in floor bridging are given by the following tables:

Span of up to 14 ft: one row near center.

14 to 21 ft: two rows placed approximately a quarter span apart and symmetrically disposed about the center of the span.

21 to 28 ft: three rows placed at approximate quarter points of the span.

This table may be used only provided the deck material is securely nailed or otherwise fastened to the compression flanges of the joists. In the case of deck material unattached to the compression flanges, the spacing of bridging in inches is specified as 109 times the least radius of gyration (obtained from property tables).

The steel in all the structural sections conforms to ASTM specification A-303 except that the minimum yield point is 40,000 psi instead of 33,000 psi.

When the joists had been properly laid and bridged, their ends were closed by track sections—channels specially made to fit over the flanges. This continuous track provided the proper support and anchor for the exterior walls and interior partitions.

After walls and partitions were in place, the roof joists were laid across them in such fashion as to provide a 3-ft overhang all the way around the house. The roof joists were the same type of section as the floor joists but smaller and lighter. Bridging sections were welded between them to provide lateral stiffness, and the open ends were encased by track sections, which were faced by sheet aluminum for decorative effect.

Altogether, 9½ tons of structural steel sections were used in the construction of this house. The steel cost, exclusive of labor for fabrication and erection, was $3,000.

For the man who is looking for a lifetime house that can be built at moderate cost, Mr. Berry would appear to have the answer.

* * *

The writer would like to thank Lewis R. Berry, Louis L. Katchen, of the B. Katchen Iron Works, Inc., and Frank F. Ransome, of Penn Metal Co., Inc., for the help they so willingly gave.

Be wise about your eyes

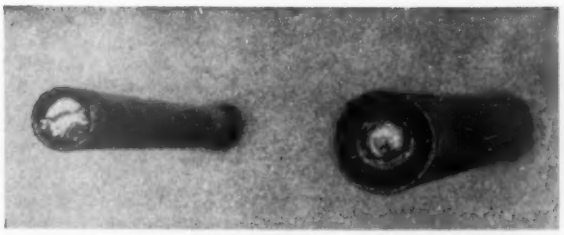
THE HUMAN eye is more complex than the most sensitive camera, yet it is durable and capable of the most exacting use.

As you read these words, light rays are being reflected from this page to pass into your eyes, being bent by their lenses to a focus on a delicate film called the retina which, in turn, sends impulses along the optic nerve into your brain where the actual record of vision is made.

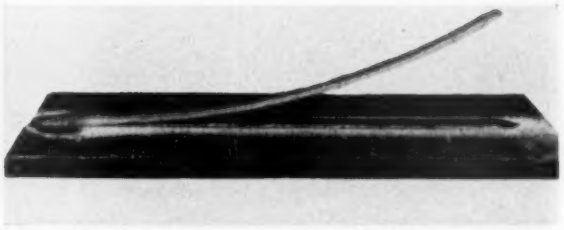
Our eyes mean so much to us that we dare not forget to treat them well. The National Society for the Prevention of Blindness states that at least one half of the blindness occurring today is unnecessary: it is due to neglect—failure to recognize the warning signals of eye trouble and failure to guard against avoidable accidents.

Some of us ignore some of nature's warning signals of possible eye trouble—frequent headaches, blurred vision, colored rings around lights—and the National Society for the Prevention of Blindness says that this omission can actually lead to total loss of vision.

For a free folder, "Your Wonderful Eyes," write to Prevention of Blindness, 1790 Broadway, New York 19, N. Y. It has basic information which may be vitally important to you.



PARTIALLY used electrodes show different thicknesses of coatings for conventional electrode (left) and powdered metal (right). Note crucible in latter



AMONG other advantages claimed for the powdered-metal coating is an almost self-cleaning weld. This slag lifted itself from the weld as the metal cooled

Powdered iron in the coating?

The case against . . . . . BY L. F. MEGOW

IN OUR *May, 1954 issue, we presented an article entitled, "Powdered iron in the coating?" by L. K. Stringham, chief engineer, The Lincoln Electric Co. At that time we commented in an editor's note:*

"In this issue, Mr. Stringham presents the 'Pro' side for the powdered-iron coating. Are there any 'Cons' in the audience? If so, will you please step forward and write us an article?"

In response comes L. F. Megow, general manager, fabricated steel products division, Hahn & Clay Machine and Boiler Works, Houston, Texas, who steps forward as the champion of the "Con" side. You'll want to read what he has to say.

—The Editors.

YOU STATED you would like to have someone step forward and write an article on the "Con" side. Here is my "Con" answer to your request.

Our company is a steel fabricating shop, function of which is to make a reasonable profit on all work turned out. To do this, it is imperative that we analyze all costs, pro and con, and arrive at the most economical solution to the problem. When the first electrodes came out with the powdered coating, we purchased a quantity and proceeded to use them on a production job. We got the usual varied comments from the weldors; that is, some thought they were good and some that they would never work out.

On the surface, they did appear to deposit metal faster, but the most important factor to the fabricator is not how rapidly any given job can be done, but how good it is and how profitable! If it costs three times as much to do a job in half the time, you are still losing 50%.

To get the facts, we adopted the following test procedure:

Two flat test plates were cut and carefully weighed. Several ¼ by 18 in. standard E-6013 electrodes and several "powdered iron in the coating" rods were selected; recommended amperages were compared and it was found that both fell in the same range. Two rods of each type deposited metal on the individual test plates—one at the high and one at the low side of the amperage range. The welds were carefully cleaned of all spatter and scale; the two plates were reweighed.

During the test a stop watch graduated in hundredths, was used to carefully time each operation. All data were carefully recorded, analyzed and reduced to a common factor: "overall cost to deposit one pound of metal."

The comparative costs are shown in the table below.

From the figures we arrived at the following conclusions:

1. The electrodes with powdered iron in the coating deposited metal in 78% of the time taken by the E-6013 electrodes.

2. The powdered iron electrodes cost 21% more per lb than E-6013.

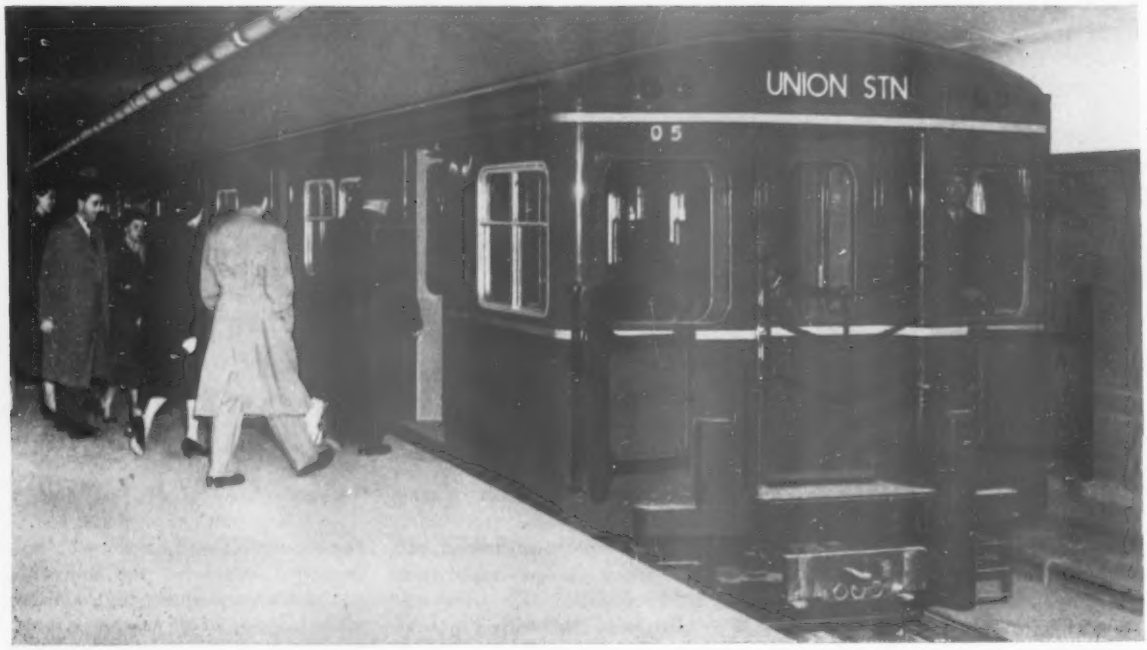
3. The overall direct cost to deposit one pound of metal, using the powdered iron coating type, was 6% greater than the E-6013.

Bear in mind, please, that the above data are the result of using only one manufacturer's electrode with powdered iron in the coating. This was only a limited test and is not therefore conclusive for all electrodes or all applications. It should, however, provide food for thought and further study.

TO THE EDITOR: I made the complete test myself, having had many years of experience as an industrial engineer. You may wish to invite other people to make similar tests using other electrodes.

Powdered Coating vs. E-6013

	Powdered	E-6013
1. Size of electrodes, inches	¼x18	¼x18
2. Electrode cost per lb of rod	$0.200	$0.165
3. Number of rods per pound	1.96	3.20
4. Time per pound deposited, minutes	7.23	9.31
5. Electrode cost per lb deposited	0.366	0.256
6. Labor cost per lb deposited	0.248	0.315
7. Change rod cost per lb deposited	0.018	0.025
Total direct cost to deposit 1 lb	$0.632	$0.596



MODERN cars on the Toronto system were made by the Gloucester Railway Carriage & Wagon Co., Ltd., England

100 working days to weld

A crew of 12 men completed an average of 26 thermit-welded joints in an 8-hour day on new Canadian rapid transit system. Passengers get a more comfortable ride, and track maintenance is vastly reduced.

TORONTO may be only the second largest city in Canada in population, but it is the first to enjoy the benefits of rapid underground transportation. The new system comprises 4.6 miles of double-track route and runs under Yonge Street, Toronto's main stem. It is approximately 65% underground and 35% open cut.

This 4.6 miles represents the first subway to be built in any Canadian city. In the United States now are 1,226.0 miles of subway and elevated track, divided among four cities, as follows:

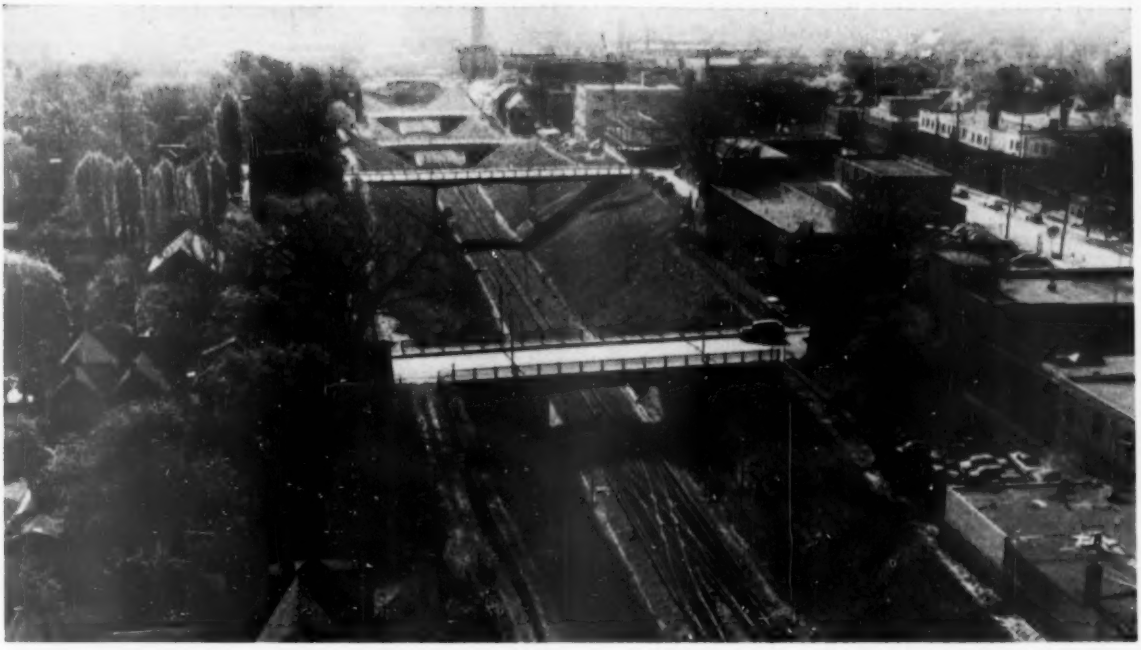
New York	861.0 miles
Chicago	226.5 miles
Philadelphia	77.2 miles
Boston	61.3 miles

Each underground section of the new Toronto subway consists of a continuous reinforced-concrete structure with a center wall between trains. The open-cut sections are laid within a securely fenced right-of-way. The route is from Front Street, at the Union Station on the southern edge of the city's business district, east about 1,200 ft to Yonge Street and under Yonge Street north to College Street, which is about the northern limit of the downtown area. North of College Street, the trains swing east about 150 ft and follow a private right-of-way to the terminal at Eglinton Avenue.

Continuous Rails

All rail on the main line is 100-lb A.R.A. section. This rail was purchased in 39-ft lengths (undrilled for joint bars) and welded into continuous trackage, broken only by insulat-

GETTING a charge ready. Thermit welding joined all the track sections



OPEN cut carries the rapid transit system north from the edge of the downtown area to the northern terminal

track on Toronto subway

ed joints and special trackwork. The same 100-lb rail is so used for the signal-controlled sections of the Davisville Yard, the remainder of the yard rail being 85-lb rail sections. The 85-lb rail was also purchased in 39-ft lengths but with splice bars.

Special trackwork on the main line consists of an operating double crossover at each terminal and four emergency double crossovers, three of which are located in the subway system. There are also two single crossovers and two turnouts for access to and from the switching yard. All these special trackwork layouts have rail-bound manganese-steel frogs.

Welding by Thermit

All the 100-lb rail on the main line is thermit welded. It took a crew of 12 men, making an average of 26 joints in an 8-hour day, 100 working days to complete the work. In each joint, a space of $\frac{3}{8}$ in. was left between the rail ends, and this was filled with molten steel of the same chemical analysis and physical properties as the rail sections.

In the subway section, the 100-lb rails are held in position by spring steel clips bolted to double shoulder tie plates. These clips are formed to bear on the base of the rail. The tie plates sit on ½-in. thick rubber pads of the same size.

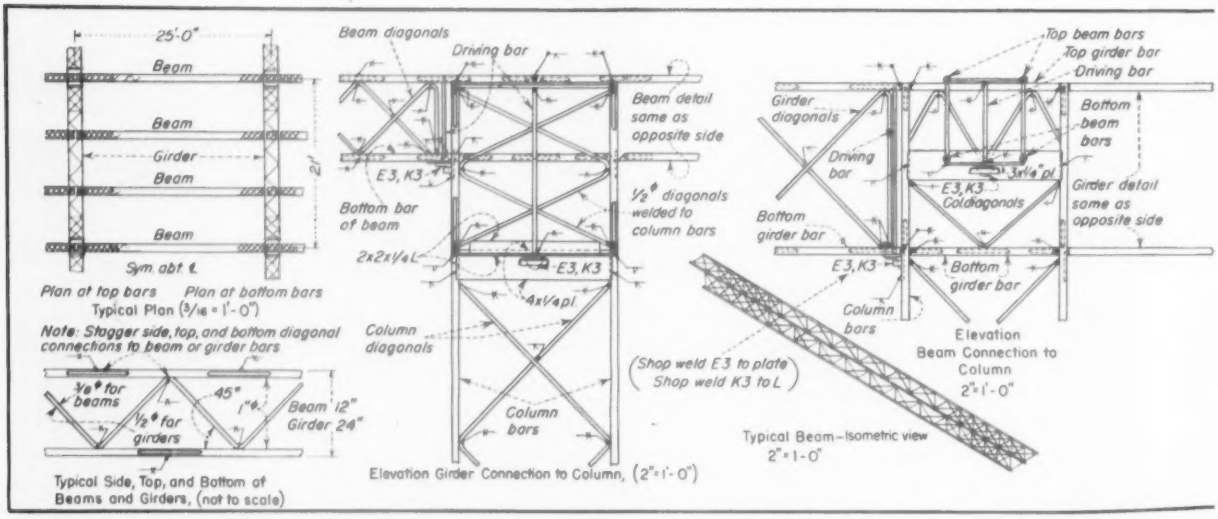
In the open-cut sections and in special-work track a standard tie and ballast construction has been used. All curves of less than 2,300-ft radius are guarded by a horizontally laid restraining rail of 85 lb section. This restraining rail is supported by cast steel chairs that are welded to special tie plates spaced at approximately 4 foot intervals.

The contact rail is 150-lb section. It is 4 1/16 in. high and has a base width of $4\frac{7}{8}$ in. The allowable carbon content was specified for a maximum of 0.20%.

The contact rail was also thermit welded, but the lengths of the sections were limited to 1,000 ft. The 1,000-ft sections were joined by expansion joints. Each section is anchored in the center against longitudinal movement.

(Continued on page 31)

THAR she blows! Another joint welded and another click click avoided



Here are the blueprints for a

BY VAN RENSSELAER P. SAXE

THESE days you get a new scare every time you pick up the paper. The "terrible arithmetic" of the hydrogen bomb makes resistance sound hopeless, but undoubtedly some types of structure will be able to withstand atomic blasting better than others. Mr. Saxe offers an ingenious approach: light walls and a roof that are meant to be torn off in order to enable the framework to stand up.—*The Editors.*

UNFORTUNATELY, world affairs show no signs of getting any better. In view of present conditions, it would behoove the engineering profession to do some serious thinking on the matter of blast-resistant structures.

It is scarcely necessary to stress the danger to our country should an appreciable number of its industrial plants be bombed out of existence. On the other hand, how can a structure be made even reasonably resistant to atomic blasting without skyrocketing the cost sheet?

The writer offers a design for a simple, easily procurable type of structure to resist blast. This report, based on a study of blast effects on all types of structures, is presented for further thought and elaboration on the part of structural engineers.

In the writer's opinion, the primary requirements are three:

First, to design a structure with exposed parts that permit most of the blast effect to travel through the structure.

Second, since it is unknown from what point the blast may originate, the structure must be designed to take load from any direction.

Third, the structure must be able to absorb the suction load following and resulting from the original blast.

Outside of the structure, the initial blast produces a horizontal pressure on the sides of the beams. When the shock has reached inside, there is an upward pressure, which is later somewhat compensated for by downward pressure on the roof. Or vice versa. Finally, suction causes complete reversal of blast pressures. It is the designer's problem to reconcile these various contradictory conditions.

1—Round Reinforcing Section

Of all the shapes and materials available, it would seem that a round section best fulfills the first requirement. The round section not only permits a blast to pass around it, but the section itself is somewhat reinforced by the vacuum created behind it as the blast travels past its curved surface.

Without question, steel is at present the strongest material, for it can pass from a lower stress to its elastic limit without failure; in the case of the instantaneous effect of a blast load, it could even go beyond its elastic limit without actual structural failure.

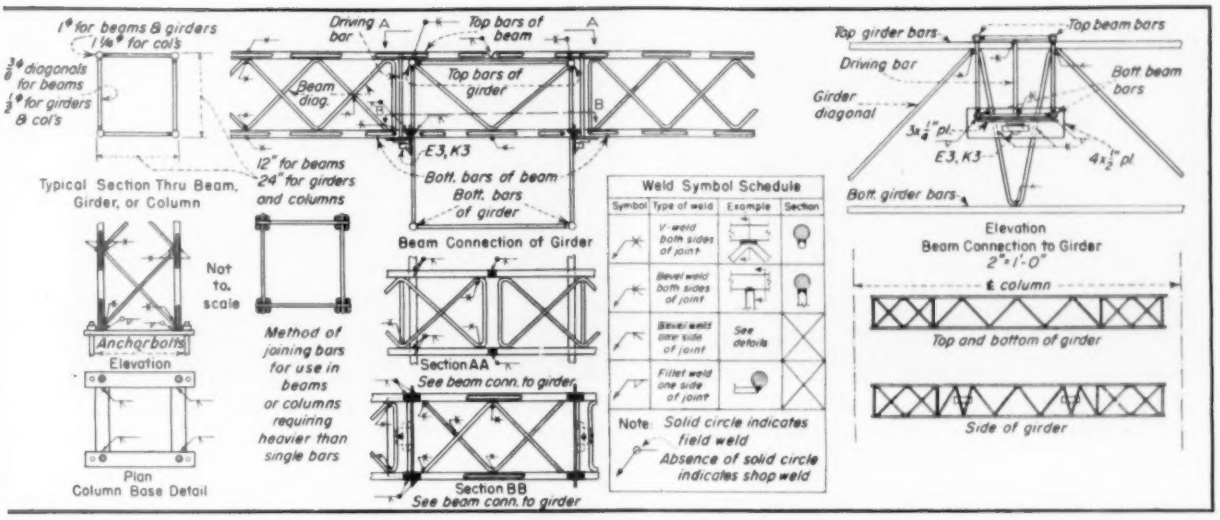
Consideration of these basic requirements has led the writer to consider the use of a round reinforcing bar as the structural element. This is used to make up an open-web type of beam, through which the blast effect and suction can pass with equal facility.

2—Beam of Square Shape

To meet the second and third requirements, the beam should have equal strength in all directions. The writer is convinced that only a beam of square shape will satisfy the various contradictory requirements. To secure maximum rigidity, such beams should be designed as continuous beams. Welding would seem to be the logical method for fabrication of such beams.

To sum up, we have a square-shaped beam made entirely of round reinforcing bars for main tension and compression and shear members. Such beams are capable of being figured for simple or continuous moments by accepted engineering principles. Some of the design details are given in the accompanying sketches.

While this type of structure may seem to be clumsy at first, further consideration brings one to the belief that it will actually appear light and airy. Furthermore, it is well adapted



blast-resistant structure

to support the many types of roof and wall material in general use for any type of industrial building.

Fabrication No Problem

There is no question of the availability of round bars, and practically any fabricator familiar with welding processes can do the work, to say nothing of the many firms now fabricating welded bar joists in such wide use today.

Ordinary jigs and processes can easily turn out straight, true beams with no more effort than that required for the manufacture of bar joists. Minor inaccuracies due to fabrication should have little effect on the strength of the completed beam. The strength secured by the relatively small amount of material required means large savings in steel. This cost saving is offset by more expensive shop work, but the field erection work is no more expensive than such work presently costs.

This type of structure can be erected rapidly with light equipment and with a small amount of field welding. In case it should be desirable to move it, the few connecting field welds can be flame-cut and replaced with new welds when the structure has been reassembled on a new site.

A structure of the type indicated can be designed with sufficient strength to resist very high blast pressure, or it can be designed with only sufficient strength to resist the blast pressures to the point where walls and roof are torn from it. This at once relieves the pressure, and the structure is left intact for future recovery. I believe that it is the actual collapse of the structure itself that causes most damage to plant operations. In an emergency, the structure could be temporarily covered with canvas and permit manufacturing operations to get started until more permanent materials could be secured.

Even in the event of total collapse, this type of structure has an advantage over heavier types. Its weight is so light that its fall would do comparatively little damage to plant equipment. The important thing, however, is that the structure itself remain in place after a blast. It is more difficult to replace the framework of a building than to replace its enclosing walls and roof.

A structure of this type could also be used for temporary or field conditions by covering it with canvas or some similar light material, even heavy roofing paper placed over temporary boarding.

In more permanent types of structure, the design will depend on just how important it becomes to maintain the walls and roof through a severe blast. It may even be advisable to have small areas of wall and roof covering of known weakness that will act as a fuse or safety plug. By their collapse, they help to save damage to the balance of the structure.

Of the materials which come to mind as structure enclosures, it would seem that such light materials as corrugated steel, aluminum or cement asbestos could be used for roofing. For the side walls, it would seem best to use metal because of the deflections that can take place in metal without destruction. Any of these coverings can be fastened to the structure by stud welding or by metal clips.

Feeling that interested engineers would prefer to apply their own design data, the writer has deliberately submitted no design calculations. Trial designs made in his office show that a surprisingly sturdy structure results as compared to the pounds of steel required. The saving in steel, however, is inconsequential and of no moment if we can secure our objective—a simple and practical form of blast-resistant structure.

Other engineers please step forward with ideas or improvements.

National Cylinder acquires California Carbonic Co.

National Cylinder Gas Co., Chicago, has acquired California Carbonic Co., Los Angeles, it was announced recently by Charles J. Haines, president of NCG. The outstanding capital stock of California Carbonic has been exchanged for 22,576 shares of National Cylinder common stock.

The Los Angeles firm sells carbon dioxide in both solid and liquid form.

1 THIS welder is not in as bad shape as some, but even so it will get the complete treatment

2 Running gear and control panel are removed. As a next step the welder will be . . . . . .

Old welders guaranteed

BY T. B. JEFFERSON

MACHINERY and Welder Corp., which covers five states from welding supply stores in Chicago, Moline, St. Louis and Milwaukee, has entered a new service field—the rebuilding of arc welders.

The company's newly established repair department is located in Milwaukee. This means that all arc welders to be repaired are sent to Milwaukee, regardless of where they may be located in the five-state territory. Though this results in freight charges, it also makes for a more economical operation since it eliminates duplication of effort at the separate branches. Furthermore, sufficient volume is insured to keep a single repair department busy—perhaps even too busy.

In addition to the servicing of customer's equipment, all repairable trade-in welders are reconditioned in the Milwaukee repair department before they are put up for sale as used equipment. Reconditioning is under the supervision of Gene Karpinski, a veteran with 25 years' experience in the repair of welding equipment.

The new repair department is equipped to handle all makes and types of welders, both a-c and d-c. Generally, it is in a position to give immediate attention to demands for emergency repair service.

ARC welder repair department of Machinery and Welder Corp. in Milwaukee provides service to five states. Gene Karpinski is department supervisor

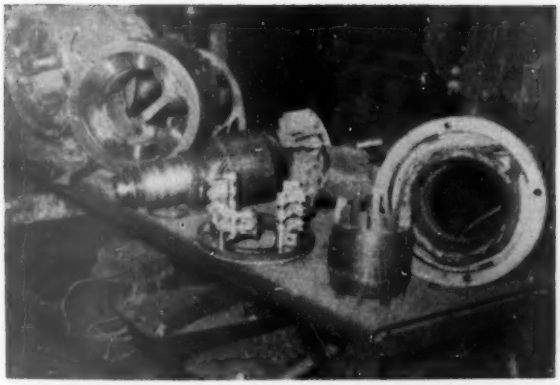
Business of the new department comes principally from three sources. The first source is the large industrial plants that have preventive maintenance programs. Such plants send in their welders at regular intervals for inspection and servicing. The "servicing" may involve only the renewal of brushes and lubrication, or it may necessitate a major overhauling job.

Of nearly equal importance from the standpoint of keeping the department busy is the reconditioning of repairable trade-ins. (Trade-ins deemed not repairable are junked.) The third principal function of the department, and source of its business volume, is building of special equipment to meet customers' specific needs.

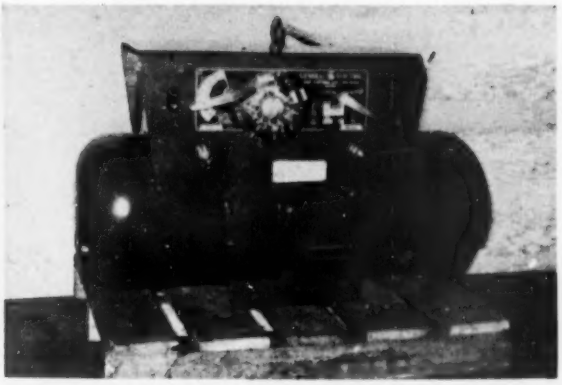
Whether it is a trade-in or a customer's machine, the M/W plan of rebuilding follows a set pattern. A flat rate schedule has been set up for the overhaul of various sizes and makes of welders. For the flat rate to apply, the machine must be in an operating condition, and no parts are to be replaced except bearings. Parts burned out or otherwise beyond reconditioning are replaced with new parts for which a charge must be levied.

OVERHAUL PROGRAM

When a welder comes in for an overhaul, the following work is performed: Disassembly, cleaning, reconditioning (broken into seven steps for m-g sets), reassembly, testing and



3 STRIPPED down, cleaned and reconditioned. In the next picture, we see how it looks when . . .



4 PAINTED. With new nameplate, welder not only looks new, but it carries a new welder guarantee

to be "good as new"

painting. The machines are repainted in factory colors, and if possible a new name plate is installed so that it will come out looking like a new machine.

On a motor-generator set, the following steps are taken after the machine has been stripped down:

(1) Recondition and reinsulate field coils.

(2) Reinsulate motor stator.

(3 Recondition commutator as required.

(4) Recondition brush holders.

(5) Recondition control panel including tap, reversing and starting switches.

(6) Check and clean rheostat.

(7) Replace bearings.

A similar program is carried out in the reconditioning of a transformer type welder. When the job is finished the component parts of the welder are in a guaranteed "as good as new condition." In fact, the reconditioned machine carries the same guarantee that is given with a new welder. This applies to used machines for sale as well as machines serviced for customers.

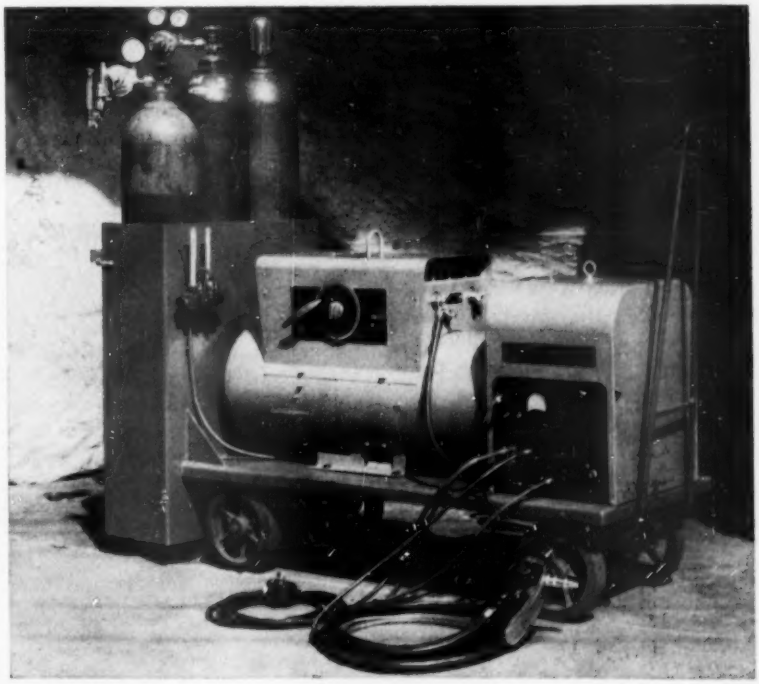
The acceptance of the preventive maintenance program to customers is evidenced by the ever growing list of companies who are having their machines processed through the department.

Special Equipment

While there are many demands for specially built equipment, usually it it not too complicated—on the order of building a running gear for a welder, say. However, some of these jobs call for extensive design and engineering to meet a customer's special service requirements.

Only recently a large manufacturer of electrical control equipment purchased a Mig welder to use on aluminum and other metals. It includes the welding head, a 300-amp motor-generator welder and three gas cylinders for helium, argon and oxygen.

Among the additional features incorporated in the special job were a gas proportioner and an extra electrode terminal. The gas proportioner made available the maximum flexibility of gas mixtures with the minimum of trouble. By adding an extra electrode terminal, one which by-passed the reactor, a means of faster starting on ferrous materials was provided.



MIG welding outfit carries cylinders of oxygen, helium and argon. Such jobs to meet special requirements are handled by the repair department

LOWER lounge is furnished in authentic Navajo and Hopi designs. Dolls are in Lucite panels, lighted up at night

"Shotwelding" Santa Fe cars

Here are the details of the famed resistance-welding methods used by the Budd Co. to build stainless-steel passenger cars for the Santa Fe and other railroads.

BY HERMAN C. PHELPS

A NEW standard of service is now offered to the traveling public by the Santa Fe Railway. Full-length dome cars of stainless steel have been put into service between Chicago and Los Angeles on the El Capitan and between Chicago and Oklahoma City on the Chicagoan and Kansas Cityan. These new cars have been designed to provide unexcelled facilities for enjoying the magnificent scenery along the Santa Fe routes.

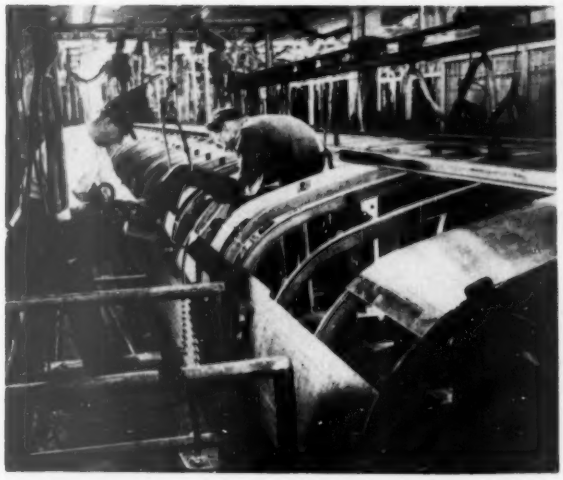
In the rear of the dome section, in the top half of these two deckers, a cocktail lounge serviced by an attendant of the Fred Harvey system seats 18 passengers. The tables give an unusual sunray effect through Lucite tops in which is embedded Australian seaweed. The table tops are indirectly and softly illuminated, and ash trays are built into them. The lower lounge also has a cocktail section, tastefully decorated in hand-painted Navajo and Hopi Indian designs. Dolls painted in full colors represent gods worshipped by the Hopis and Navajos long before the appearance of the white man.

These full-length dome cars for luxurious coach travel are just one example of the stainless steel railroad passenger cars being built by the Budd Co., Philadelphia, by means of its "Shotweld"* process. All of the stainless steels used for fabrication at Budd are of the 18-8 type, containing either 2% molybdenum or small amounts of columbium and titanium for stabilization. Since 18-8 cannot be hardened by heat treatment, it must be hardened and brought to the desired strength by cold rolling at the steel mill. Some of the strength given to it by cold rolling is lost by heating. Stainless steel, unless it is the stabilized type, should not be heated locally for the purpose of removing buckles or straightening as is common practice with ordinary steel. When it is necessary to restore maximum ductility, the whole piece should be heated above 1,900 F and cooled rapidly.

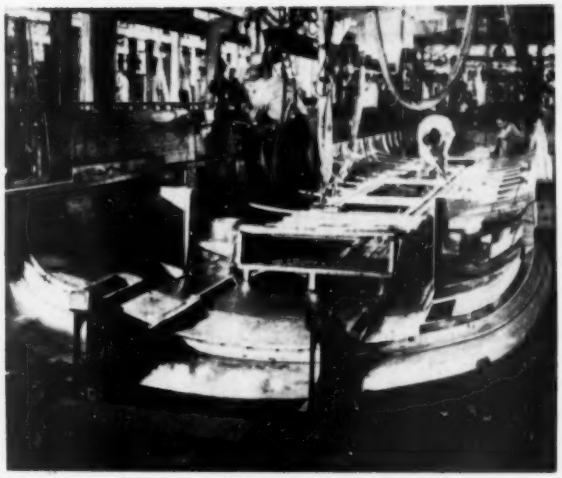
*Registered U. S. Patent Office.

Shotwelding Is Spot Welding

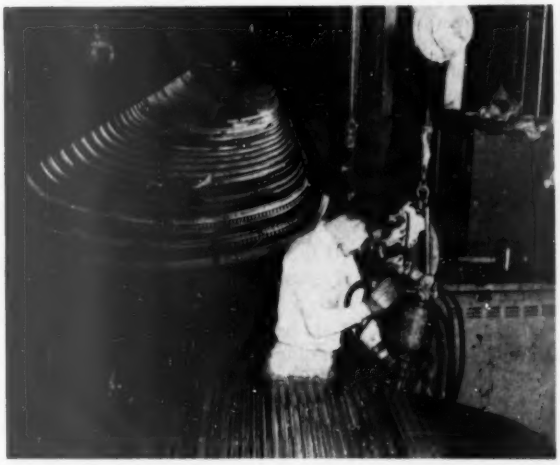
The "Shotweld" system of welding stainless steel produces uniform spot welds of specified strength by very accurate control and supervision of current time, tip force, electrode size and shape. The system employs very



PORTABLE gun welder spot welds the frame and side panels of a stainless-steel railroad passenger car

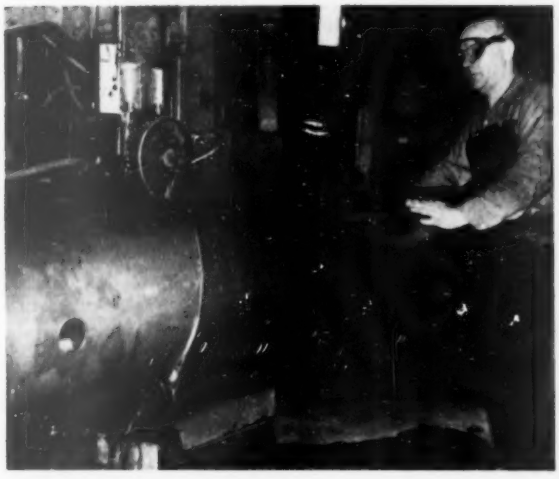


DOME section is turned upside down, making welding and installation of ceiling fixtures easier tasks

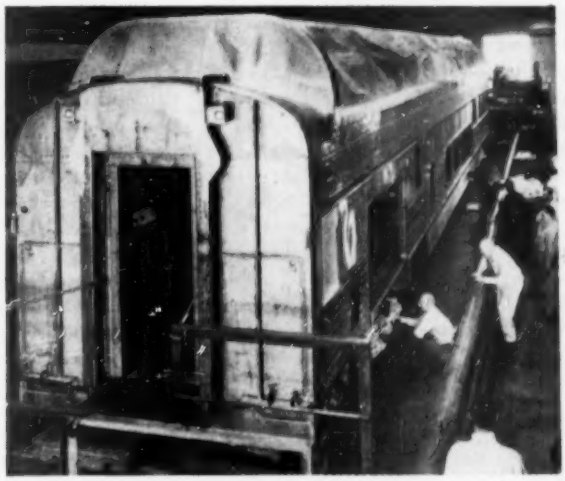


ARMED with a "repeater" spot welder, operator is fastening down the roof section at one end of the car

WELDING of window frames to the frame is one of the few jobs for arc welding found on these new cars



BUDD keeps three seam welders busy on such jobs as longitudinal and circumferential seams of water tanks



FULL dome car undergoing 2,000,000-lb compression test. Government regulations require only 800,000 lb

short periods of current flow to avoid the harmful carbides produced by welds of long duration.

Engineers at Budd claim spot welds in cold-rolled, high-tensile stainless steel result in soft, ductile nuggets to join the high tensile area. They use the formula I^2RT to determine the heat generated in a weld; that is, the current squared is multiplied by the electrical resistance of the weld zone and then multiplied by the time of current flow. The resistance depends upon tip contour, tip cleanliness and force at the weld area. A variation in one or more of these quantities will cause a variation in weld strength.

The Budd "Shotweld" system requires the use of a weld recorder. This instrument records on a paper tape the amount of I^2T; that is, the time and current conditions under which the weld is made. The third variable, R, is controlled by proper supervision of tip dressing, cleanliness of material, fit-up of parts and the net electrode force (erroneously called electrode pressure).

Contrary to popular belief, an operator can make many bad welds with a recorder on his machine. The recorder only denotes whether or not the machine is welding as it was adjusted to do in the beginning when the tests were made. Weldors, themselves, are responsible for:

(1) Tip dressing
(2) The strength of welds
(3) The spacing of welds
(4) The location of welds
(5) The appearance of welds

With this system, test welds are very important because they are the foundation on which the house is built. If conditions pertaining to the job are the same as they were when the test was made, the strength of the production welds will be equal to that of the test welds. The weld recorder, weldors' consciences and adequate supervision are relied upon to detect any change in conditions that might affect weld strength.

The production department supplies the coupons used in making test welds, which are available at all test booths. The tensile strength or hardness of the steel are distinguished by differences in the length of the test specimens.

Method of Testing

Budd uses three types of physical tests: a pull test, a peel test and an etch test. The pull test is made by welding two or more test pieces together and then pulling them apart by a tensile machine. This machine registers the force needed to break the weld. Peel testing is made by fashioning a series of welds at the correct spacing in the proper test pieces and then peeling or tearing off the desired thickness. All of the welds must peel slugs and be uniform in size and shape.

The etch test is made by cutting half a weld, polishing it and then dipping it in an acid bath for about one minute until the weld slug is clearly visible. The formula for the etching reagent is one part hydrochloric acid(specific gravity 1.2) to two parts of a 20% solution of chromic acid.

Dialing for Welds

The weld timer acts as an accurately controlled switch to control both the *amount* of current flow and the *time* of current flow. The unit also houses the recorder voltage compensator and the sequence panel. The various dials and switches of the timer are discussed in the order in which they are set to make a weld.

First, the welding chart is consulted by the weldor. The proper tool hook-up is made, and the tip force is adjusted to the required value.

The second step is to set the timer for the required time of current flow as indicated on the welding chart. This is done by adjusting the dial marked time-cycles. All timer dials are returned to zero before resetting, thus eliminating false settings.

The third step is to set the sequence panel. This is controlled by the three small dials at the bottom marked "squeeze time", "hold time", and "off time." The "squeeze time" delays for a few cycles the firing of the timer until the tip force has reached its maximum value. It permits the electrodes to squeeze together before the welding current starts, thus eliminating burnt welds and uncertain pressure applications. The "hold time" delays the opening of the electrodes to make sure the weld is sufficiently cooled before the tips open. The "off time" when set on "repeat" controls the time between the end of one weld and the start of another. A small switch near the "off time" dial disconnects the automatic repeat when one weld is desired with each separate squeeze of the button.

The values at which the sequence panel dials are set vary with the type of tool, stroke of the tool, thickness of the metals to be welded, fit-up of the parts and length of the air line. Therefore, the sequence panel dials are set to give the best results and yet not slow down the welding unnecessarily.

Two dials labeled "course adjustment" and "sensitivity normal" must be adjusted to prevent the recorder from being damaged while the current setting is being determined. The "course adjustment" is set in the No. 1 position and "sensitivity normal" at zero. Before the "heat" dial is adjusted, the "sensitivity normal" dial should be increased until the recording needle deflects into the center of the "safe zone" on the tape.

To set the "heat normal" dial, a series of welds are made on test material, which duplicates the material to be welded. For gages up to 0.022 in., "heat normal" dial is then increased or decreased until a very slight flash or sparkle is obtained between the faying surfaces. If the gage thickness is over 0.022 in., the heat is adjusted until a flash is obtained, then decreased until the flash nearly disappears. This method of heat adjustment gives an approximate setting that warrants making a pull test.

Before any physical tests are made the weld recorder is set. This makes it possible to obtain a permanent record of the test welds for comparison with the "job" welds.

Nearly all timers have two sets of "heat" and recorder "sensitivity" dials; one set is marked "normal" and the other "auxiliary." A pilot light below the "heat" dials also shows which dial is in operation. The duplicate dials enable the operator to switch from one current setting to another, say when changing from two metal thicknesses to four, without having to go to the timer itself. This remote control change of heat settings is achieved by changing a switch on the pendant that hangs from the transformer between the welding tools or is fastened to the face of the cylinder of a pedestal welder.

There is only one "timer" dial, but the changes in pile-up for one tool usually do not require different time settings. The "reset" button resets the "timer" after the recorder has registered an underweld or overweld.

The tacking switch cuts out the recorder for tacking. This is a locked switch, and only welding foremen and

maintenance men have keys. At the top of all timers are three colored lights. The red indicates power on the timer. The yellow shows water is flowing through the tubes. The green indicates that the tubes are heated and the timer ready to weld.

The weld recorder checks:

1. Variations in voltage. A lowering of voltage supply means less current, and this causes small weak welds.

2. Variations in current. This may be caused by heating of the transformer, heating of the secondary cables, heating of the tool, loose cable connections, shortening of the tool against the jig, faulty timer and welding with highly magnetic steel between the arms of the tool.

3. Variations in weld time. This is caused by faulty timer operation or by early model timers that do not have a sequence panel. It is also caused by the opening of a manually operated pushbutton before the weld is completed.

4. Weld-zone resistance variations. This is caused by the presence of dirt, ink or paint on the surface of the metal.

Recorder Has Limitations

The weld recorder does not check: flattening of the electrode tips, tip variations caused by poor fit-up or variations in the air pressure.

Every weldor must be able to interpret his recorder tape and adjust his machine to proper setting. Altogether, there are approximately 250 individual units and three seam welders used on the railway cars.

Welding current comes to the plant at 66,000 volts. It is then transformed in the power house to 13,200 volts and distributed to nine substations. Here it is reduced to 440 volts and sent through low-reacting lines to the individual circuit breakers. Nearly all the "Shotwelding" is confined to an area 700 x 800 ft. The plant has 1,600,000 gallons of water trapped just for cooling the resistance welding machines. All this water is aerated and chemically treated to inhibit rust and algae. Every few months the inhibitor has to be changed because the algae soon develop a resistance to it and their growth causes the lines to foul.

The latest type of sequence-controlled air pressure system is now employed. This system eliminates the possibility of welding before pressure is applied to the work. Under the old method, burnt welds and uncertain pressure applications frequently existed.

After the air leaves the pressure regulator, it goes through an electrically operated solenoid valve, then through a speed control valve, and finally to a pressure switch and the tool. Mounted on the welding tool is a two-stage control button with two sets of contacts. When the operator pushes the button down part way, it closes the first (top) circuit, which initiates or energizes the solenoid valves. When the air pressure builds up in the tool, it backs up into the pressure switch and closes the contact. As soon as the operator pushes the button all the way down, the timer circuit is initiated and the "squeeze time," which delays the firing of the timer for a few cycles, goes into operation.

Testing a Whole Car

Budd made the first and only system in which a complete car can be tested. It can be loaded vertically, the sides can be pushed in and it can be pushed endwise to a pressure of 2,000,000 lb while 500 electric strain gages and 60 "extensometers" record the strain in every member, important or otherwise.

The electric strain gages have enormously speeded up the progress of testing. All gages are wired to a centered control panel, and the readings are recorded as fast as the operator can push the proper buttons. With this amazing equipment, Budd can do as much testing in three days as it formerly took three months to accomplish.

One thing for sure: if every company would go to as much trouble as the Budd Co. does to find out how good its welds really are, there'd never be a failure.

TORONTO SUBWAY

(Continued from page 23)

There are about 1,400 welded joints in the contact rail. This welding was done by a second crew of 12 men, who averaged 22 joints in an 8-hour day.

The reason for the welded trackage is given by one of the engineers:

"In both design and construction, the main objective was to provide trackwork which would afford the passengers a safe, comfortable ride and at the same time require a minimum of maintenance. In the Yonge Street Subway, we feel that we have accomplished this objective."

From Horse Car to Subway

Public transportation in Toronto has developed through a series of well defined periods. The first was from 1849 to 1861, in an era known as the omnibus period. In these years, the population grew from 24,000 persons to 45,000. The city covered an area of about nine square miles, and most of its people lived within easy walking distance of home and business.

From 1861 to 1891 passengers rode in horse-drawn street cars that used steel rails. This improvement brought about extensive development. Total area of the city increased to 17 square miles, and the population grew from 45,000 to 170,000.

From 1891 to 1921, Torontoans rode electric street cars under the control of the Toronto Railway Co. During these thirty years, the horses lost their jobs and electric motors took over. Also during this time, track was extended to all parts of a 17-mile area, and the population increased to 350,000 by 1910.

The Railway Co. refused to take care of the needs of the population growing up outside the old city limits, which was a severe blow and setback to the logical expansion of the transportation facilities of the city. At this particular time there were almost no automobiles, except for the last four or five years, and the opportunity to build up a real transportation system was lost for a long time.

In 1921, the Toronto Transportation Commission was formed and assumed control of the Public Transportation system. By 1941, the city and adjacent municipalities were served by a coördinated public transportation system, using street cars, buses and coaches. The development of this system is familiar to all the citizens and perhaps deserves the credit given to it by many experts that Toronto has the best street railway system in North America.

On January 1946, the rapid transit plan was submitted to municipal electors, who decided in its favor by a vote of 77,935 to 8,360.

Photos courtesy Metal and Thermit Corp.

1—CUTTING and beveling 6-in. pipe. This special cutting machine can handle pipe up to 24-in. diameter

2—STANDARD circle-cutting set-up is being used to flame-cut discs from 2½-in. plate to fit these holes

*Piping and petroleum plus

The oxyacetylene flame solves many maintenance and repair problems for a modern oil refinery.

BY JAY BLAND

Senior Project Engineer, Engineering Research Department, Standard Oil Co. (Indiana), Whiting, Ind.

INCREASED demands for gasoline and other petroleum products, and the more recent developments in petro-chemicals, have necessitated the introduction of new processes capable of producing greater quantities of higher grade products. These processes require large pressure or reaction vessels and a complexity of process piping. In addition, the petroleum industry is confronted by the usual fractionating towers, condensers, absorbers and similar process vessels found in all refineries.

Though many fabrication, maintenance and repair problems that arise in a refinery have probably been encountered in other industrial plants, the vastness of petroleum refining operations frequently presents situations peculiar to that industry alone. Here we present a survey of the uses of the oxyacetylene flame in the petroleum industry, using a large modern refinery as an example.

The most extensive use of the oxyacetylene flame in the petroleum industry is for the cutting of steel. The oxyacetylene cutting process provides rapid preparation of plates and piping for subsequent fabrication, with a minimum of touch-up and at minimum costs. Generally, most oxyacetylene cut edges or welding groove bevels are merely wire-brushed to remove the loose oxide layer and are used with no further preparation.

The frequent changes that follow new developments in refining processes and the modifications attending plant expansions both demand the oxyacetylene cutting torch for rapid disassembly. A modern refinery will use many other processes employing the oxyacetylene flame. These include brazing, braze welding, welding, flame-priming, low-temperature stress relieving, spray metallizing and hard-facing. It might also be mentioned that the oxyacetylene flame has been used in the field for the heat treatment of items such as chisels, a practice that probably should not be encouraged.

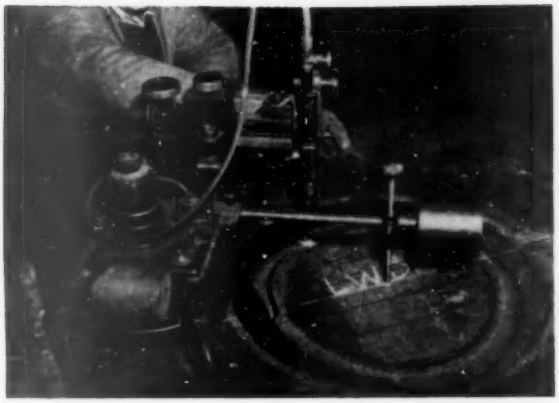
A true picture of the extent to which the oxyacetylene flame is used in the petroleum industry cannot be derived entirely from a consideration of its use in any single refinery. In general, the bulk of refinery construction is performed by outside contractors, and their extensive use of the oxyacetylene flame should be considered in deriving an overall picture. The suppliers of equipment, parts and replacement items also contribute materially to the total extent of use. Here, however, we can cover only that limited portion of the overall use performed by refinery personnel. Although these applications may appear to be on a small scale, they represent an important part of refinery operations and contribute materially to the productivity of any petroleum refinery.

Heavy Gas Usage

During an average week a large modern refinery, such as the Standard Oil Company refinery at Whiting, Indiana, will use about 11,500 cu ft of acetylene and 27,500 cu ft of oxygen. These proportions indicate that a considerable amount of oxyacetylene cutting is carried out, since for most flame processes other than cutting the volumes of each gas would be more equal.

Oxygen and acetylene are piped into the welding shop from a manifold system of 20 oxygen and 12 acetylene cylinders. At locations for which no line outlet is provided, the usual two-cylinder buggies are used. These are spotted around the refinery at the various field welding booths and at each process unit during maintenance and repair operations. About 60 such buggies are currently in

*Abstract of paper presented at the annual meeting, International Acetylene Association, Chicago, April 7-9, 1954.



3—CLOSE-UP of cutting. Operator adjusts torch position manually to the contour of the rolled plate

4—DISC to fit shell is beveled by machine shown in photo 1 by tack welding disc to the end of a pipe

welding and flame-cutting

service, and an equal number are being built to satisfy present requirements.

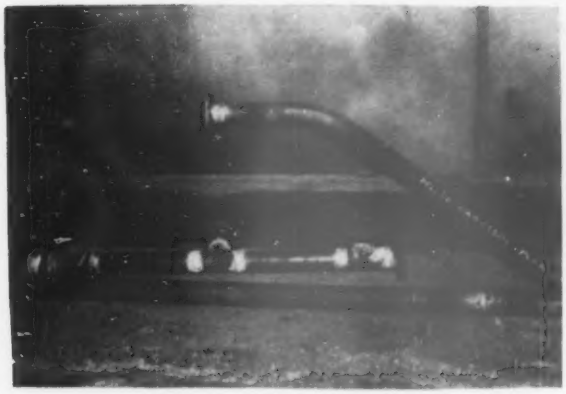
It is difficult to obtain data reflecting the quantities of gases used for each of the oxyacetylene flame processes. A job shop or a production shop would normally be interested in specific information on the consumption of the gases for each item produced in order to maintain adequate cost records. A refinery welding shop, however, is concerned primarily with maintenance and repair, and it is enough to apply an overhead charge to the labor for any particular job. This overhead charge includes the oxygen and acetylene costs, the costs of filler metals and materials and the supervision cost. Thus there is no breakdown to give specific cost figures in oxygen and acetylene.

Furthermore, one finds it difficult to estimate specific usages based on the number of active gas weldors. Among various refineries the classification of "acetylene weldor" covers only those specifically qualified for oxyacetylene flame welding, including possibly braze welding and brazing. However, most of the oxyacetylene cutting is performed by acetylene cutters and frequently by arc weldors as a routine matter; the extent of this work cannot readily be determined.

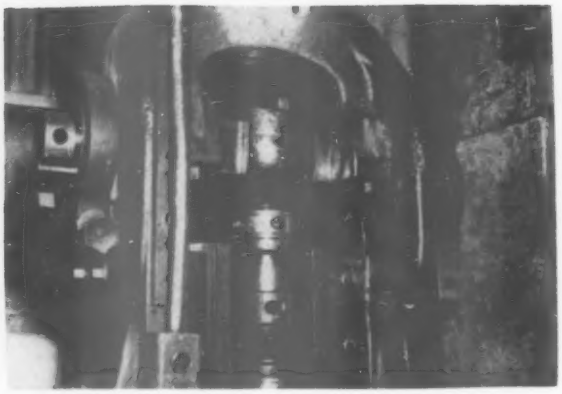
23 Weldors and Cutters

The Whiting refinery welding shop regularly utilizes the services of twelve qualified oxyacetylene weldors. In

5—TO CUT holes in vertical shells, this machine was developed. Opening seen above was previously cut with a square edge and is now being beveled



6—OXYACETYLENE welding is used for such ticklish jobs as fabrication of acid lines from red brass pipe



7—BROKEN punch press frame required three braze welds to effect a repair. Oxyacetylene torch was used

view of the cyclic nature of the work load, the number employed specifically on welding or on any one of the similar flame processes will vary considerably. Periods during which process units are down for inspection, repair or maintenance will require a considerable shift in the location of weldors and in the types of work which they perform. As a consequence, most of these oxyacetylene weldors must be able to handle a wide variety of flame processes.

In addition to acetylene weldors, there are eleven men who work only on oxyacetylene cutting. Included in this group are the men who operate the several machines for oxyacetylene cutting. The cutters also do the major portion of plant disassembly operations; and in many instances they have to work under adverse conditions at high elevations and in all kinds of weather.

It might be pertinent to note that many of these oxyacetylene cutting or welding operations are being performed within the refinery, near products that are highly flammable. Therefore, it is extremely important to establish and to maintain firm standards of safety. These safety standards are adhered to rigorously, and no weldor will light an oxyacetylene flame until he has been assured by a qualified inspector that safe conditions have been established.

Mechanized Pipe Cutting

Oxyacetylene cutting operations include both manual and machine work. A major portion of the machine oxyacetylene cutting is for the preparation of plates and pipe for subsequent fabrication by arc welding. In most instances only wire brushing of the loose oxide scale is required; sometimes light grinding is done to provide a root face or to assure good fit-up. Cutting machines available for this work include several used for plate cutting, and a special unit for the preparation of pipe. This unit is cam-actuated to produce almost any type of intersection for pipes.†

Photo 1 shows the machine cutting and simultaneously beveling a 6-in. diameter pipe. The torch remains stationary and the machine rotates the pipe under it. Similar operations can be done on pipe up to 24-in. OD. Holes for branch connections can also be cut. Axial movement of the torch is provided by a cam unit, mounted on a movable arm, which is synchronized with the rotation of the pipe. When outlet holes are being cut in straight-run pipe the torch rotates around the required center, and the cam changes the torch height as required by the pipe curvature.

The welding shop requires considerable adaptability of equipment to meet unusual applications. Examples of these are shown in photos 2 through 5. Photos 2 and 3 show insert discs, to be welded in a shell, being cut from a 2½-in. plate. The plate has been rolled to the diameter of the shell. A standard cutting machine, arranged to cut circles, was adjusted manually by the operator to conform the contour of the plate. Subsequently, the discs were beveled on the large cutting machine, as shown in photo 4. Each disc was simply tack welded to the end of a pipe, and the cam-actuated torch followed the plate curvature.

†See "Precision Pipe Cutter," Welding Engineer, Jan., 1954, page 44.

Machine shown in photo 5 was specially developed to cut holes in vertical shells. It is quite portable, and is adjustable in speed and in the size of hole which can be cut. The hole shown in the shell was cut previously with a square edge and is now being beveled on the outside; a similar bevel will be made on the inside to complete the required joint preparation. The insert discs described above were fitted into these holes and welded.

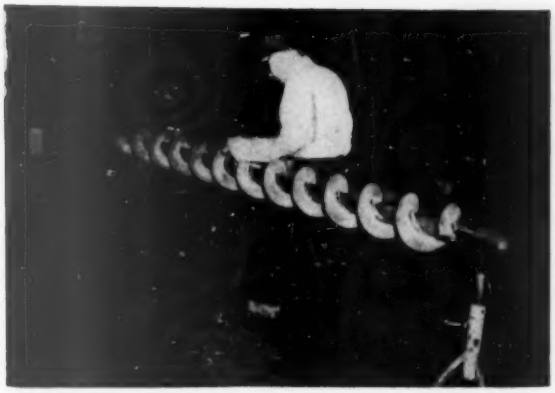
A special application peculiar to a petroleum refinery is the cutting out of furnace tubes. This operation required the utmost skill to prevent grooves from being cut in the header seat into which a replacement tube must be rolled.

A refinery as large as the one at Whiting involves more than process equipment. For example, this refinery maintains a car repair shop where tank cars and coke cars are reconditioned as required, and where some repairs of worn crossing frogs are made. These frogs, made of high-carbon steel or austenitic high-manganese steel, are built up by oxyacetylene welding.

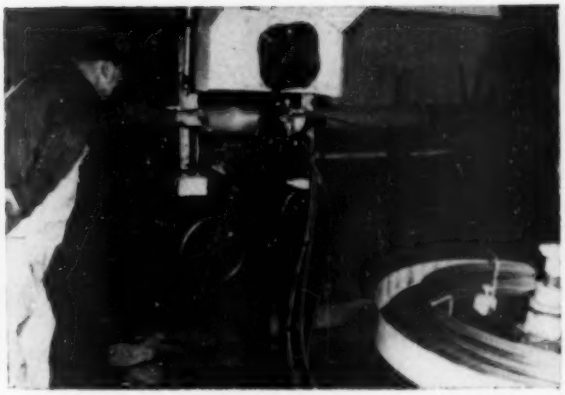
Other oxyacetylene cutting operations performed in the refinery include rivet cutting and flame-gouging. The special tips for these processes are maintained in regular stock in the welding shop tool room. Most of these operations are done in the boiler shop, in which most plate-cutting jobs are carried out.

Gas Welding Popular

Oxyacetylene welding in this refinery is used for practically all commercial metals and alloys. Steel weld-



8—EDGE of this conveyor screw is being hardfaced with the torch and a cobalt-chromium-tungsten filler



9—METALLIZING is also useful. Here a large pump shaft is being sprayed with a chromium stainless iron

ing is limited generally to sheet metal, to a few special applications and to small-diameter pipes. When such pipes are to be butt welded into long lengths to be formed into steam coils, the smooth oxyacetylene weld reinforcement is an advantage. The sheet-metal applications include both black iron and galvanized iron, and the products include cans, buckets, barrels, belt guards and electrical connection boxes.

Oxyacetylene welding of aluminum is done on such items as an aluminum agitator door, the cast aluminum hinges of which had broken off. It is also necessary to weld brass. Photo 6 shows several assemblies of red brass pipe for acid lines after fabrication by brass welding. A considerable amount of this work is done in the refinery.

Other applications include the repair of cast-iron parts using cast-iron filler metal, the welding of light-gage stainless steel, and the repair of various bronze alloy pump parts. A large amount of lead welding (usually called lead burning) is done. Lead linings must be supplied for steel acid tanks and lead steam coils for heating tank contents.

Braze Welding and Brazing

Three typical oxyacetylene braze-welding operations are cited for mention. Photo 7 shows a punch-press frame repaired by braze-welding; three braze-welds were required for this job. A number of similar jobs have been done to salvage broken machine tools and similar equipment that otherwise might have had to be scrapped. As an example, a cast-iron pump clamp from one of the company's lake tankers was repaired by braze welding, using a high-zinc brass filler metal. In another job a braze weld was made to join a steel nipple to a malleable-iron elbow fitting to be used in the automotive testing laboratory.

A large amount of oxyacetylene brazing, using silver alloy filler metals is done at the refinery, particularly in connection with the chemical research activities of the company. Most of the special equipment required for these research projects require brazed connections to assure tight joints between the various vessels, tubes and pipes.

Oxyacetylene brazing is also used in the electrical shop for joints requiring low electrical resistivity and for many copper and brass applications involving small-diameter tubes of rather thin walls.

Hardfacing, Metallizing

The weldor in photo 8 is hardfacing the edge of a screw conveyor blade, using a cobalt-chromium-tungsten alloy filler metal. In a similar job done on a heavy pump shaft sleeve, the preheating was accomplished in a specially built brick furnace, open at the top. The sleeve was held, and rotated as required, by a welding positioner.

An application which can be classified as either hardfacing, welding or braze welding, is the build-up of bronze or steel surfaces with aluminum-bronze filler metals. Bronze pump valves and various types of steel valve gates are conditioned in this manner.

The refinery uses spray metallizing extensively for building up worn pump shafts. A typical application is shown in photo 9. Here a 12%-chromium stainless iron is being sprayed onto a large pump shaft. The metallizing gun is mounted on a lathe carriage, using the lead screw to provide longitudinal movement while the shaft is rotating in the lathe centers. This produces excellent uniformity of deposit and minimizes subsequent finishing operations.

Heating and Other Processes

As an example of the application of the oxyacetylene flame to heating, a railroad car bolster was heated to a red heat preparatory to straightening operations. The large-size tips rapidly heated the steel to the temperature required for subsequent sledging to straighten the bolster.

Specialized processes such as flame-priming, used for the preparation of rusted or scaled steel plates prior to painting, and low-temperature stress-relieving operations, have generally been done by outside contractors. Refinery personnel have used the oxyacetylene flame for infrequent flame-straightening jobs. So far as the author could determine, there have been no specific instances of the use of the flame-hardening or flame-softening processes applied as such; the oxyacetylene flame has been used for both treatments, incidental, however, to other operations.

In conclusion, the author wishes to acknowledge the invaluable assistance of the personnel of the Whiting Refinery welding shop; in particular Messrs. George Paul and Barney Schafer. The permission of the Standard Oil Company (Indiana) to publish this article is also appreciated.

1—WEIRD looking pipe manifold is all submerged-arc welded except where curved pipes are bolted to header

2—SUBMERGED-ARC welding of heavy flange to head of a dehydrator vessel requires an adjustable turntable

Tailored-to-job fixtures speed submerged-arc welding

"Hi" Talley and his boys at American Pipe and Steel Corp. have worked out many ingenious ideas for the fabrication of welded tanks and pressure vessels.

BY FRED M. BURT

AMERICAN Pipe and Steel Corp., Alhambra, Calif., can boast of over half a century of steel fabrication. Just as Alhambra has grown in the past fifty years from a sleepy California village to a bustling city of 55,000 population, so has American grown from a small group of less than a dozen men to the present organization of around 350.

Said to be the largest independent steel fabricator on the Pacific Coast, American specializes in pipe, tanks and pressure vessels. To list even a small portion of the many vessels American has welded together, or even to mention all the various types, would be a nearly interminable job. Suffice it to say that there are large numbers of American-constructed tanks scattered up and down the West Coast (including a tank farm of eighteen 31,000-gallon L.P.G. tanks) and large bulk storage tanks ranging up to 80,000 bbl capacity all over the United States, in Pacific islands and as far away as Saudi Arabia. Many American-built standpipes range up to 100 ft in height and will hold up to a million gallons of water.

This company probably makes a greater variety of specialized and standardized tank containers than any other manufacturer in the West, if not in the entire United States. Its products and service range through the broad fields of agriculture, petroleum, aviation, transportation and public and private utilities.

Cowboy Turns Weldor

The success of this big-scale fabricator is based heavily upon the large number of employees who have been with it for 25 to 30 years or more. In 1919 a comparatively young man named H. T. Talley put in his application for work. Born in Oklahoma, Talley had worked for cattle companies all over the Southwest and Mexico. However, he had become a married man and was searching for more lucrative employment than cow punching He taught himself welding by working overtime and became American's first code (certified) weldor. (American now has about 40 certified weldors.)

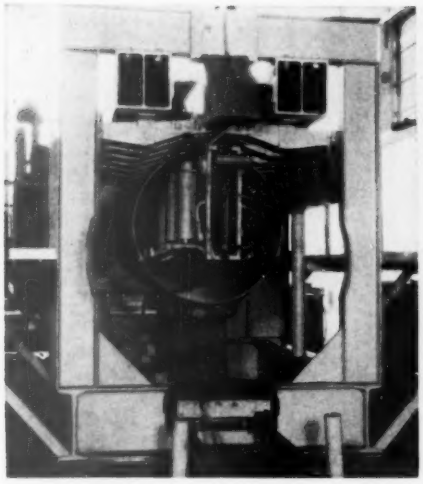
Today the ex-cowboy is plant manager, and the design and/or building equipment can be credited to "Hi" Talley. Many of the ingenious fixtures designed and built by Mr. Talley and the men who work with him represent revolutionary improvements in the production of welded vessels and other fabricated steel products.

Other key officials of the company include: Jack Lane, president; Robert English (Rear Admiral, USN, Ret.) vice-president in charge of manufacturing, engineering and research; J. G. Stevens, executive vice-president.

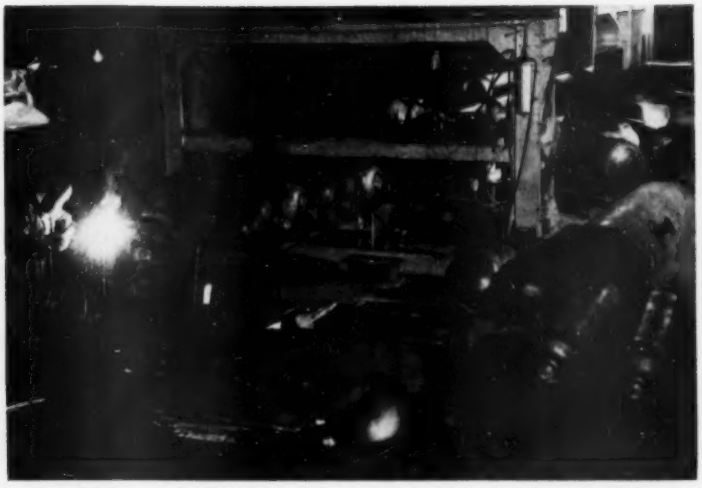
Pipe and Pipe Products

About 1,000 ft of pipe is produced every day by the company's continuous pipe mill. Diameters range from 3 to 6 in.; lengths up to 60 ft; wall thicknesses are 10 gage or lighter. Skelp (strip steel) enters the mill and is formed into pipe shape by curved rolls. As the steel passes through the center of the mill, welding equipment automatically fuses a continuous seam. After welding, the pipe passes through additional rolls, which straighten it and size it to uniform diameter. Finally, an automatic flying saw grips the pipe and cuts it into uniform and exact length without slowing down the mill's continuous operation.

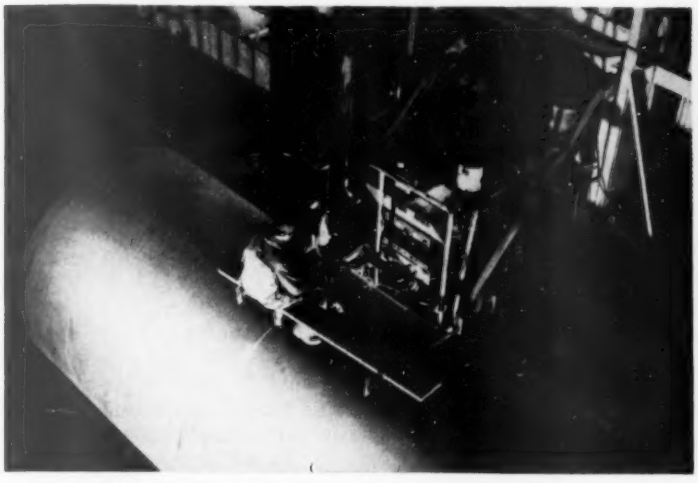
An ever-growing amount of the company's ever-growing volume of



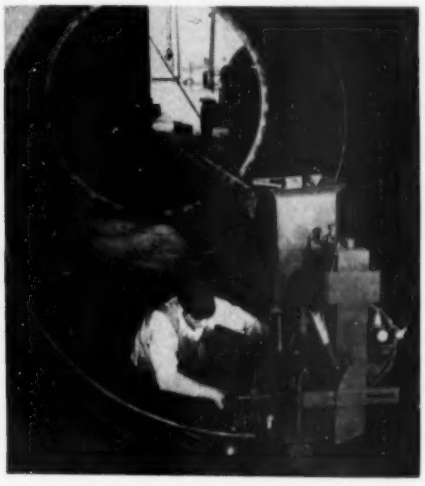
3—"STRAIGHT seamer" welds longitudinal seams of L.P.G. pressure vessels



4—CIRCUMFERENTIAL seams to join heads to shells are welded on two production lines. This line is for diameters up to 24 in.



5—OPERATOR rides with the machine to weld outside seams. Both circumferential and longitudinal welds can be made on large vessels

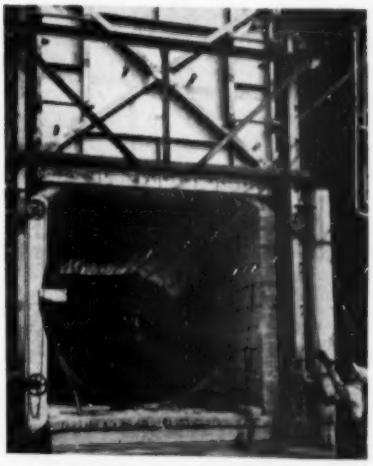


6—INSIDE seams are welded by this counterweighted head while tank rotates

welding is done by the submerged-arc process, which today accounts for around 70% of the total amount of welding done at American. The company has 24 submerged-arc welding heads, which are mounted in a variety of ways to meet standard and specialized job requirements. Submerged-arc welding, according to Mr. Talley, not only lowers production costs but improves the quality of the welded seams. Since much of the company's work is done to meet the exacting specifications of pressure vessel codes, the latter advantage is as important to it as the first .

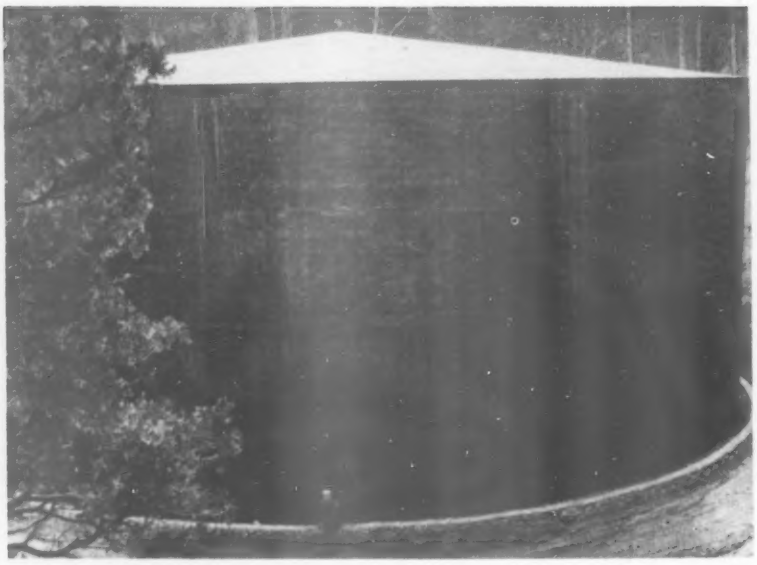
An example of how versatile submerged-arc welding can be is provided by the large pipe manifold (photo 1). This complicated contraption for use in a petroleum field system is practically all submerged-arc welded except where bolting is required. The main cylinder and the flanges were submerged-arc welded, and the 8-in. pipes were fabricated by submerged-arc welding before they were bent to their curved contours.

Photo 2 shows the submerged-arc welding of a heavy flange to the head of a dehydrator. The turntable on which the workpiece is mounted will accommodate parts up to 12 ft in diameter and can be tilted to any desired angle. Off to the left (not shown in the picture) is another turntable on which smaller parts, down to 10-in. diameter, can be mounted. The welding head can be adjusted for work to be done on either fixture.



7—LARGE vessels can be stress relieved in two or three sections

8—CARRIAGE at top carries the welding head along horizontal seam



9—FOUR-COURSE water tank, 80 ft in diameter, is the one being submerged-arc welded on the left. Vertical seams had to be welded manually

When quantity production of pressure vessels ranging up to 42 in. in diameter and up to ¾ in. thick is required, the submerged-arc "straight seamer" shown in photo 3 is used. The pressure delivered from cylinders of compressed air holds the exact alignment of the seam, while the welding is done outside and from above. On work of this nature, 100% penetration is required, as determined by X-rays.

High-Pressure Production

Photo 4 shows one of the production lines for pressure vessels used, principally, to contain liquified petroleum gases. The longitudinal seams are submerged-arc welded on the fixture in photo 3. The heads are pressed on and tack welded, and the vessels are then rolled to the submerged-arc set-up at the left of photo 4 for the welding of their circumferential seams.

There are two production lines for the L.P.G. pressure vessels. The one in photo 4 produces containers from 9 in. to 24 in. and lengths up to 6 ft. The outer line is for vessels from 20 to 24 in. in diameter and up to 12 ft long. All the longitudinal seams of vessels in both production lines are welded on the fixture shown in photo 3.

In the production of larger cylinders for all-welded pressure vessels, the sections of flat sheet or plate are cut to micrometer accuracy on power shears. These large shears will handle plate up to 12 ft long and ⅜ in. thick. Thicker or longer plate is cut by flame-cutting machines, which square and bevel the edges simultaneously.

American has bending rolls of many different types, sizes and speeds to form not only cylinders but ovals, angles, and other shapes. The company's slogan is: "Whatever the bend —American forms it." The larger bending rolls can handle material from 20 gage up to an inch or more in thickness. One of the pyramid-type plate bending rolls (with hydraulic drop end) takes 1¼-in. plates in 16-ft lengths and forms them to inside diameters as small as 28 in.

The ends of each formed section of a large pressure vessel are tack welded together to precision fitting, and the longitudinal seam is welded by a tractor-mounted submerged-arc welding head. The various welded sections are then assembled and tack welded.

Welding of the outside circumferential and longitudinal seams is done by means of the special submerged-arc welding fixture appearing in photo 5. The platform on which the operator rides moves to the work at the same time the welding head is brought into position.

The inside circumferential welds are made by a submerged-arc welding head mounted at the end of a counterweighted 4-in. pipe (photo 6). The outside section of the fixture is carried on rails, enabling the welding head to be placed exactly as required over each inside seam.

Confronted with a quoted price of $6,000 for a fixture to do this inside submerged-arc welding, Hi Talley designed and built his own at an appreciable saving. The small wheels in the foreground of photo 6 support the welding head while the tank is being rotated. Placement of the welding head is controlled by the 4-in. pipe. The pipe runs out to a counterweight arrangement (just visible in the background) that makes it easy to raise and lower the head or move it back and forth inside the tank to each new position.

Most of these large cylindrical pressure vessels will serve as storage tanks for liquefied petroleum gases. A popular size, manufactured as standard, is the 31,000-gallon-capacity vessel; this is 108 in. in diameter and 60 ft long.

Stress Relieving in Sections

American has a gas-fired furnace that will handle tanks up to 9 ft in diameter, with close thermostatic heat control up to 1,600 F. Tanks too long for the furnace can be stress relieved in sections. In photo 7 we see one end of a 7-ft-diameter tank 60 ft long. The first 35 ft of this tank were placed on

(Continued on page 52)

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TA-252-P	10-400 amperes	235 amperes	100%
TA-253-P	15-600 amperes	350 amperes	100%

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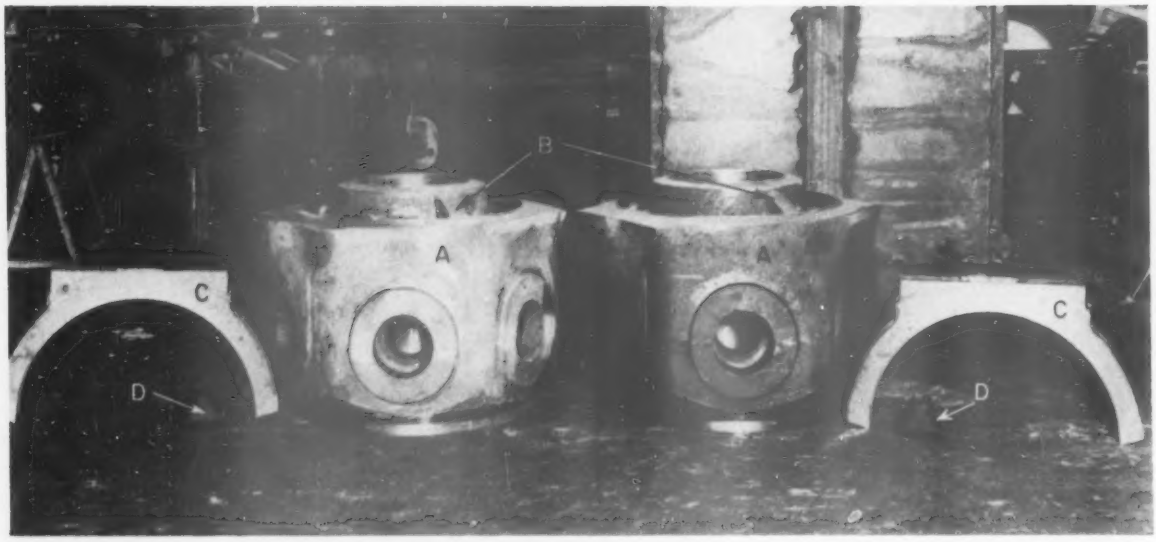


TRIANGULAR pieces "D" and the half circular band pieces "B" are required to complete the outer jacket of cylinder

85 passes made on this cylinder

DESIGN for a large compressor called for a six-ton double-walled cylinder to be made so that suction and exhaust chambers would be included in the jacket space. The inner cylinder was to have an ID of 16 in. and 2½-in. walls. The outer shell would be roughly hexagonal with a wall about 3 in. thick at the center of each face and an ID of approximately 42 in. Though casting seemed the only way of producing the part, how do you make a casting when you can't get the core out?

The Cooper-Bessemer Corp., Grove City, Pa., solved the problem by casting the double-walled cylinder in two parts and joining the halves by submerged-arc welding. Production is now a straightforward job of aligning the castings and applying multi-pass welding techniques.

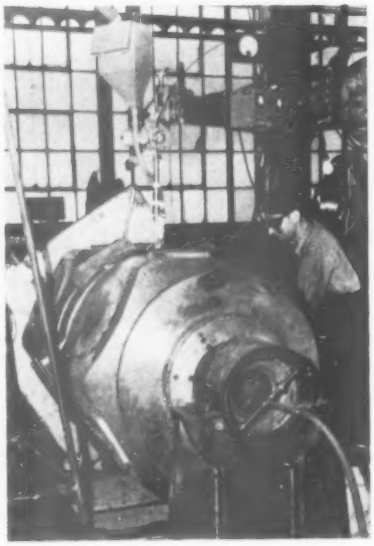
The six parts of the assembly appear in the top photograph. The half circular band pieces required to complete the outer jacket are indicated by "C" and "C". "B" and "B" on the two big castings "A" are two partitions that run the entire length of the jacket space and divide it into its two compartments: the suction chamber and the exhaust chamber. Besides these partitions, there are several webs between the inner and outer cylinders. The two triangular pieces "D" are welded to partitions "B".

After the mating faces of the two castings have been machined, the cylinder halves are put into a turning fixture and carefully aligned. They are manually tack welded into place, and the cylinder is preheated to about 450 F by burning gas inside. The inner weld then is made by submerged-arc welding. About 30 passes are required.

Manual arc welding is done to join the two triangular "D" pieces to the partitions. Two strips of ¼ by 1 in. steel are welded to the inner edges of the outer shell to back up the girth welds. The two semicircular "C" castings are placed in position and joined to each other by strongbacks.

The girth joints are completely filled by submerged-arc welding, passes, as shown by the photo at right. A total 55 passes are needed. The strongbacks are removed as soon as the two girth welds are made, and the two joints in the band are filled in by manual arc.

Some welding details: current is 575 amp., d-c. reverse polarity supplied by a rectifier welder. Electrode wire is high-tensile steel. Because of the amount of metal to be deposited, this job was almost impossible to do by manual welding and had been turned down by several firms.



INNER and outer cylinders were both submerged-arc welded. Inner weld required 30 passes and outer weld being made (above) 55 passes

The welded cylinder is ground, checked with a dye penetrant and annealed. Overall fabrication time is 16 hours, of which 10 hours represent actual welding. A number of these giant compressor units are now being built for cross-country transmission-line pumping stations.

Photos courtesy Linde Air Products Co.

IN ONE MINUTE'S TIME

AWS Class E-6012 electrode produced this fillet

THIS MUCH MORE WELD

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Besides being fast, EASYARC 12 is far easier to handle. Welds are made by "dragging" the electrode along the joint. Spatter is almost negligible. And EASYARC 12's slag is practically self-cleaning.

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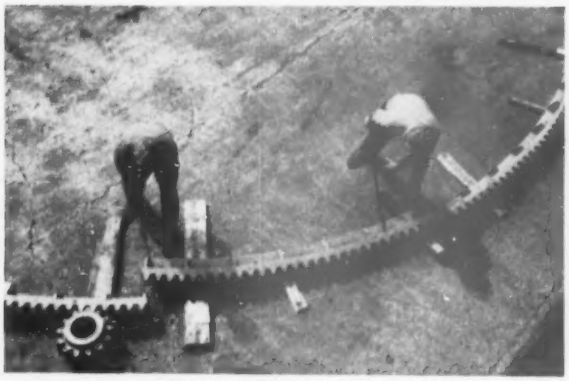
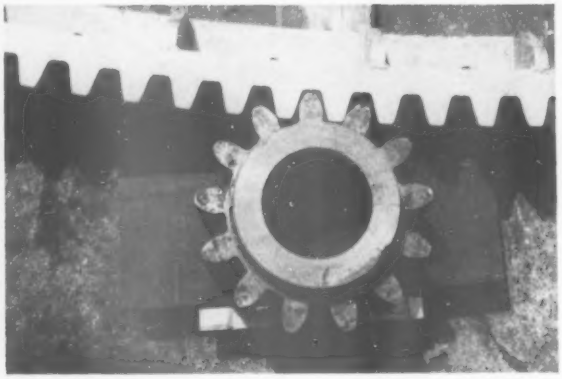
32-ft bull gear . . .





. . . flame-cut in sections

BY BILL SHERIDAN
Technical Representative, Air Reduction Sales Co.

How large is a Diesel-electric gantry crane if the bull gear used for "slewing" the crane measures 32 ft in diameter? If you don't want to take the time to figure it out, more details will be given later on. Right now, however, our business is with the bull gear, considered to be the most difficult part of the crane by its fabricator, Derrick and Hoist, Inc., Long Island City, New York.

Twelve sections—each about 8 ft long—make up the ring of teeth for this enormous gear. The gear sections were flame-cut from 1040 rolled steel plate 6 in. thick. By combining a pantograph-type oxyacetylene cutting machine with an electronic tracer, perfectly shaped teeth were obtained all the way around the 100-ft circumference. Furthermore, each of the eight separate arcs of the big ring joined together in perfect alignment.

To flame-cut a section required one hour of actual cutting time. The cutting speed averaged 7½ ipm, using pressures of 10 psi acetylene and 125 psi oxygen. The accuracy of cut is said to equal or exceed the accuracy of machine-cut cast-steel gears, and the cost is much less.

A test assembly of the eight sections was made prior to shipment. Proper fit-up was provided by drilling holes for bolts to join the circular arcs together.

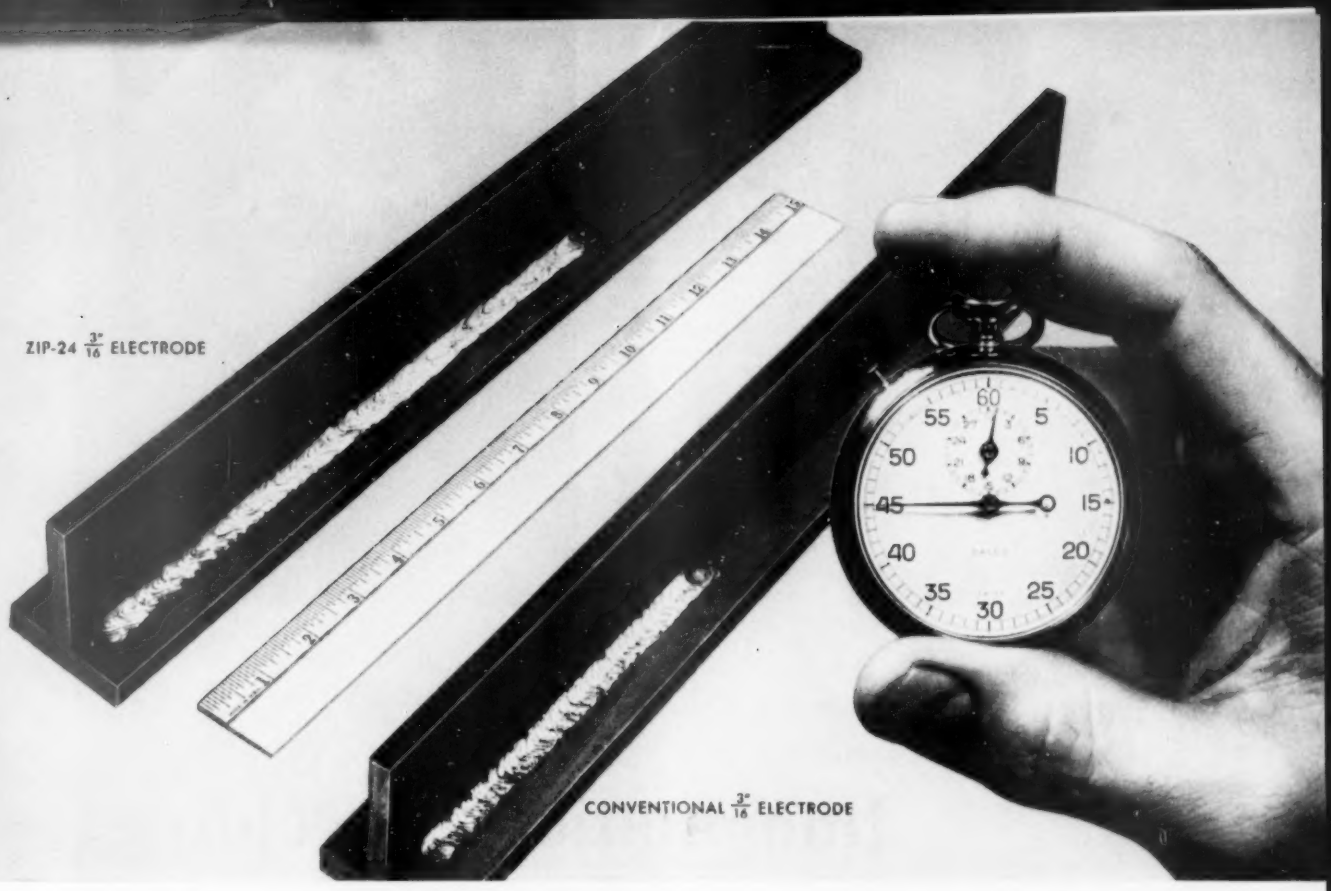
Designed by Derrick and Hoist, Inc., for the U. S. Navy, the completed crane was to be employed at a navy yard for placing of aloft radar equipment on the mast tops of giant aircraft carriers. The crane travels on 32 wheels around curved tracks, revolves on a turntable driven by the 32-ft-diameter bull gear and its relatively tiny pinion. The crane is able to lift a load of 70 tons at 115-ft reach, 20 tons at 165-ft reach or 10 tons at 230-ft reach. The total length of the boom is approximately 215 ft.

Pictures show:

TOP: Overall view of 32-ft-diam gear for 50-ton gantry crane. The men are checking for tolerances and completing layout for assembly of gear's 100-ft circumference

LEFT: Crowbars aid fit-up of one of the gear's 8-ft sections

RIGHT: Interlocking teeth of bull gear and pinion. The pinion appears tiny but is actually 16 in. OD, 7¼ in. ID and 6 in. thick



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PROBLEM 1:

To weld aircraft engine mounts of chrome-moly steel tubing. Solution was to design a special adapter for Tig welding that had larger holes to allow greater argon flow

PROBLEM 2:

To eliminate interruptions caused by shifting positions. A motorized fixture allows welding to be done continuously

Modern welding equipment and factory facilities, trained personnel and comprehensive quality controls are all very well, but for prospering in a field where competition is stiff, there's nothing like

Imagination in welding

BY THOMAS A. DICKINSON

CERTIFIED Welding and Engineering Co., Los Angeles, has prospered, despite stiff competition, ever since it was founded eight years ago.

Specializing in aircraft components, the company has welded engine mounts of chrome-moly steel tubing, leakproof hydraulic reservoirs, ramjet motors for helicopters, air-conditioning units, seats and rocket supports. All of these products have to be made in conformity with government specifications. About 65% of the welding is done by the tungsten inert-gas (Tig) process, the remaining 35% being divided among ordinary arc welding and oxyacetylene welding.

Here are some examples of imagination in welding:

Difficulty was being experienced in the welding of chrome-moly tubular structures. An investigation disclosed that the standard adapter was not allowing enough argon to blanket the weld adequately. No criticism of the standard adapter is intended—it just didn't fit this particular application. The remedy was to construct an adapter with enlarged holes. The larger shroud of argon did the trick. Naturally, the new adapter increased argon flow (and cost), but it allowed the company to be certified for the welding of chrome-moly tubes.

The new adapter is now being used on virtually all types of steel and on aluminum, magnesium and titanium.

Instead of keeping tungsten electrodes of assorted diameters on hand, Certified Welding standardizes on 3/32-in. electrodes. Its experience has shown that this one size is adequate for thicknesses ranging from 0.020 in. up to ¼ in. Operators, however, are required to keep their electrodes ground to a fine point.

Mixed Gases Solve Problem

In welding heavy aluminum components, adequate penetration was not being obtained. The reason was that the argon atmosphere dissipated the heat too quickly. When helium was substituted for argon, heating was adequate, but the resultant welds were "dirty." It was decided to try experimenting with various combinations of the two inert gases. A mixture comprising 40% helium and 60% argon, by volume, worked satisfactorily on all accounts.

Flux for Tig welds in thin stainless steel and Inconel proved inadequate for the production of aircraft ducts and reservoirs. Hence the company began using helium. Helium back-ups for welds made with argon-shielded electrodes turned out to be another good idea.

Thousands of dollars have been saved during the past two years by providing workers with a powered fixture. This is simply an adjustable metal frame supporting an electrically-driven shaft. Parts to be welded are mounted on the upper end of the shaft, either in the horizontal position or at an angle. A foot control enables a worker to regulate rotation of the motor and shaft-attached parts in accordance with the speed required for the given type of weld.

Discoloration in welds made with the oxyacetylene torch is another problem that once bothered Certified Welding engineers. They decided it was due to the contamination of flux with aluminum oxide from the aluminum flux pots. A switch to stainless-steel flux pots proved the guess was right.

As many as 50 weldors have been employed in the company's 50,000-sq-ft plant. Equipment includes seven a-c arc welders, four d-c arc welders (all fitted with accessories for Tig welding), an automatic Tig welder, 15 oxyacetylene welding outfits, facilities for magnetic-particle and fluorescent inspection, a Rockwell hardness tester, degreaser and other tools.

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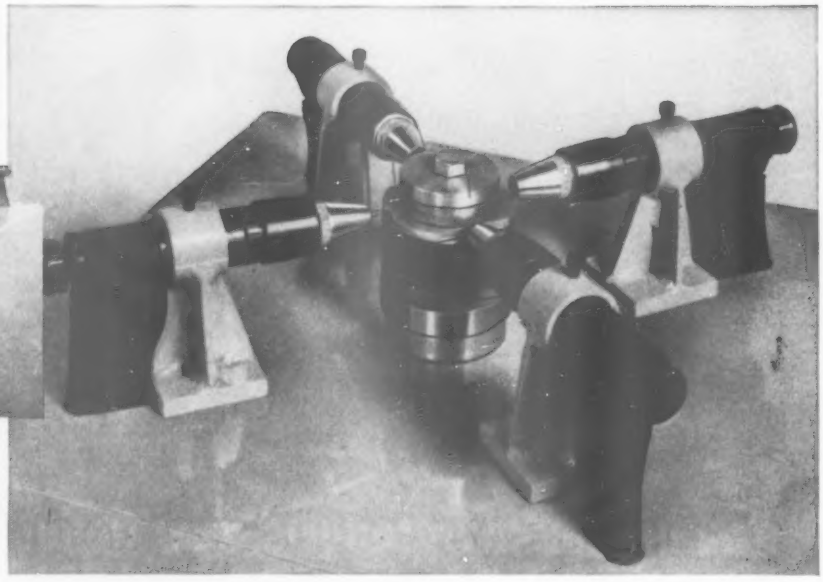

This unit is equipped with a water cooled, high speed HELIARC HW-13 torch—ideal for machine welding.

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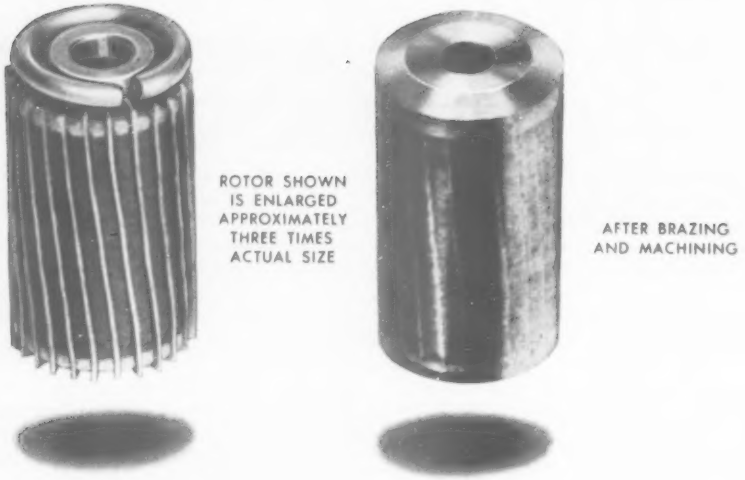
Indication	Cause	Correction
Narrow and deep regular marks.	Wheel too coarse.	Use finer grit.
Wide irregular marks of varying depth.	Wheel too soft.	Use harder grade of wheel.
Widely spaced spots on work.	Oil spots or glazed areas on wheel face.	Balance and true wheel. Avoid getting oil on wheel face.
Uneven marks on work.	Whipping belt.	Take up belt.
Fine spiral or thread on work.	Faulty wheel dresser.	Replace cracked or broken diamonds; use slower dressing traverse; set tools at angles of 5 degrees down and 30 degrees side; turn diamond every third dressing; tighten holder of diamond. Dress with less penetration; do not allow tool to dwell in contact with wheel; do not start dressing cuts on face--locate diamond on face but start cut from edge. Make final pass in dressing in direction opposite to grinding traverse; traverse diamond evenly across face of wheel; round off wheel edges.
	Faulty operation.	Prevent penetration of advancing or following edge of wheel by being careful to dress wheel face parallel to work; reduce wheel pressure; replace worn parts which permit swiveling of wheel head. Provide additional steadyrests; reduce traverse in relation to work rotation; when making numerous passes make slight change in traverse rate at each pass to break up pattern.
Wavy traverse lines.	Ragged wheel edges.	Round off wheel edges.
Uneven traverse lines.	Worn traverse drive parts.	Eliminate play; replace worn parts.
Isolated deep marks.	Improper wheel dressing. Chatter or hammering. Coarse grits or foreign matter in wheel face. Bond disintegrates, grit pulls out.	Use sharper dressing tools; flush wheel with coolant after dressing. Remove cause. Remove by dressing. Coolant too alkaline for some organic bonds; decrease soda or change coolant.
Irregular marks.	Loose dirt settling on machine	Keep air and shop clean; install dust collectors.
Irregular marks of various lengths and widths; scratches usually fishtail.	Dirty coolant.	Provide efficient filter; clean tank often, flush guards, etc., after dressing and when changing to finer wheels.
Deep irregular marks.	Loose wheel flanges.	Tighten flanges using blotters or lead washers.
Grit marks.	Wheel too coarse or too soft. Too much difference in grit size between roughing and finishing wheels. Dressing too coarse.	Select correct wheel. Use finer roughing wheel or finish out better with roughing wheel. Less dresser penetration and slower dresser traverse.

** From The Grinding Wheel by Kenneth B. Lewis, Grinding Wheel Institute, 1951.*



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Elements and components of Servomechanisms must be assembled with incredible precision plus exceptional durability. For instance, operational requirements call for the rotor shown above to be rotated at 400 revolutions per second at temperatures ranging from −150° F to over +200° F. The joints in this bonding must have high conductivity, and no flux can be used in joining. They must also be free of any tendencies toward corrosion or crystallization and must have exceptionally high strength: This special bonding problem was one of the biggest production hurdles facing Servomechanisms, Inc. until the one right solution was found in PHOSON.

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Welding Info-Aids . . .

1 COPPER RODS—Ampco Metal, Inc. This firm is offering copies of "Tentative Specifications for Copper and Copper-Alloy Welding Rods," ASTM designation B 259-52T, AWS designation A 5.7-52T.

2 ALUMINUM RESEARCH—Aluminum Co. of America. 54-page booklet entitled "Research at Alcoa" includes 40-page bibliography of more than 1,000 books, technical papers and articles prepared by Alcoa research scientists in past 35 years. Included in the bibliography is a section on welding aluminum.

3 HARDFACING—The Lincoln Electric Co. 2-page illustrated Bulletin 1330 tells how use of new "Spreadarc" oscillating attachment cuts hardfacing costs. "Spreadarc" mounts on any of firm's automatic welders to make wide pads of weld deposits. It oscillates the head at right angles to direction of travel.

4 MULTIPLE GRINDING — Merit Products, Inc. Illustrated leaflet explains how "Grind-O-Flex" wheels can be used in multiples to increase work area. The flexible, abrasive-cloth wheels can follow any contour.

5 GAS REGULATORS — Air Reduction Sales Co. 36-page Catalog 806 illustrates gas cylinder, manifold and pipeline regulators with complete descriptions covering specifications and operating data. Flow and pressure charts are included.

6 CLAMPS—Wilton Tool Mfg. Co. General Catalog No. 110 describes many types of clamps, vises and positioning devices. This new edition contains more than 150 illustrations.

7 ELECTRODE—Alloy Rods Co. 4-page illustrated Bulletin AR-5 gives complete details on physical properties, applications and welding procedure of new "Wear-Arc Super WH" electrode for use in welding manganese steel.

8 X-RAY UNIT — North American Philips Co., inc. "Norelco MG 160" is 4-page folder describing new portable, self-contained, industrial X-ray radiographic unit. Applications include examinations of welds.

9 GRINDING DISCS — Raybestos-Manhattan, Inc. Illustrated Bulletin No. 6901-E contains application data and lists advantages of "Moldiscs" for portable grinders and sanders.

10 WELDING DESIGN—Eutectic Welding Alloys Corp. "Manual of Design and Welding Engineering" is title of 14-page booklet that contains detailed instructions on joint design with many drawings showing difference between bad and good design. A section is devoted to overlaying and hardfacing. Illustrations show inspection and control.

11 SOLDERING, WELDING — Joyal Products, Inc. 4-page illustrated booklet describes soldering and spot-welding equipment and accessories. Machines are said to be particularly applicable to assembly of fine parts in jewelry, instruments and electronic components—also for spot welding ferrous and non-ferrous metals.

12 ELECTRODES — The International Nickel Co., Inc. 2-color, 4-page pamphlet shows typical applications of "Ni-Rod" flux-coated electrodes with a high-nickel core for all cast iron repair and construction. These electrodes are said to produce sound, machinable welds in cast iron with little effort.

TO OBTAIN: manufacturer's catalog or bulletin described on this page, use the card sections printed below. Insert number of the item or items that interest you. WELDING ENGINEER will ask manufacturers to send the information requested.

Each card section must be completely filled out. Do not use ditto marks. These cards are not good after Nov. 1, 1954.

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Fill out card section and write in number of item as shown at right:

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Title.....
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CARDS NOT GOOD AFTER NOV. 1, 1954

13 REGULATORS—The Harris Calorific Co. 3-color, 4-page folder tells of L-type regulators for gas welding and cutting operations. Supervisory control may be exercised over quantities of gases used because these "Multi-Stage" regulators can be preset with safety, according to manufacturer. Proper pressures are set by independent "key" that is returned to supervisor's possession.

14 SEAM WELDER—Sciaky Bros., Inc. Bulletin No. 321-7 tells of firm's "MP 2," air-operated, press-type, low-impedance, single-phase seam welder. Features include internal gear drive; low-inertia, antifriction bearing guided ram; dual-cylinder pneumatic pressure system.

15 GRINDING WHEELS—Norton Co. New 28-page catalog describes line of grinding wheels. Illustrated booklet contains typical application photographs, size tables, prices, operating speeds and other data.

16 STUD WELDING—Nelson Stud Welding Div. Wall chart is intended to facilitate selection and ordering of welding studs. Also included in "Cost Saver Kit" are manual entitled "How to Design for Nelweld" and firm's stud welding catalog.

17 ELECTRODES—A. O. Smith Corp. 24-page Bulletin No. WE-166 covers in detail the metallurgy of stainless steels, provides a Smith stainless-steel electrode selector table and offers other tabular material on welding processes. Each of the firm's electrodes for stainless steel work is described in detail. Illustrated.

18 SPOT WELDING—Ames Spot Welder Co., Inc. 4-page illustrated brochure tells how firm's engineering staff has designed special welders and fixtures for manufacturers of wrought-iron and simulated wrought-iron products.

19 RESISTANCE WELDING—Venus Products Co. 4-page pamphlet explains properties and uses of "Sci-Tron," an electrical device developed for instrumentation in resistance welding. Its purpose is to provide two points to which an oscilloscope or oscillograph may be connected to permit observation of welding current.

20 SPOT WELDING DATA—Birdsell Mfg. Co., Inc. Chart gives data on use of firm's spot welders, and recommends type of machine to use for various thicknesses of mild steel. Information includes tip diameter and shape, tip pressure, weld time, current.

21 POSITIONERS—Harnischfeger Corp. Bulletin PL-1 is new descriptive brochure on "P&H" welding positioners. Fully illustrated bulletin outlines important features and gives condensed specifications on four different models with capacities up to 35,000 lb.

22 TORCHES—National Welding Equipment Co. 4-color, 36-page booklet (Form 8) illustrates and describes air-gas torches as well as oxy-gas torches. Shows typical applications and includes specifications and data on mixers and torches.

23 WELDING CLAMPS—Hallwell Tool Co. Specifications and pictures of "fast-action" C and tooling clamps are included in 4-page brochure. Holding pressures range from 1,500 lb to 4,000 lb.

24 FLUXES—Alpha Metals, Inc. 4-page brochure describes line of solder fluxes, including non-corrosive flux for electrical and electronics industries, and general-purpose and aluminum fluxes.

25 WELDING SHIELD—Frommelt Industries. 2-color illustrated folder describes and gives prices of "Spa-Fla," a portable safety welding shield made from heavyweight, fire-resistant, treated fabric. Galvanized wire fabric insert makes it applicable for chipping and grinding operations.

26 WELDING TORCH—National Cylinder Gas Co. 2-page Form NTW-128 illustrates and gives specifications of "Torchweld 45," new medium-duty tool for pipe welding, automotive welding, sheet-metal fabrication or any welding within range of 28 gage to ½-in. thickness in steel. Prices included.

27 SPOT WELDERS—Duro-Dyne Corp. 4-page illustrated booklet describes "Greyhound" portable and stationary spot welders. "Model SP" welds up to ⅛ in.; "Model BW" welds up to ¼ in. No finger action required because of automatic switch control. Includes prices.

28 WELDING, CUTTING—The Liquid Carbonic Corp. Catalog No. 5490 lists complete line of "Gasweld" equipment for welding and cutting. Catalog offers equipment for use in the entire flame field from welding and cutting to heat-treating operations.

29 WELDING CLAMPS—Cincinnati Tool Co. 8-page folder pictures and describes "Hargrave" welding clamps, including forged steel C clamps and spring and carriage clamps. Includes specifications.

30 REGULATORS—Victor Equipment Co. 16-page Bulletin 341 illustrates and describes line of high-pressure and corrosion-resistant regulators. These "Gas-O-Dome" regulators are for applying high pressures to apparatus that requires a constant pressure at low volume.

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This extra quality at no extra cost is typical of the entire Tube Turns' line. You can specify TUBE-TURN Welding Fittings and Flanges and *know* that you will get the *exact* answer to your specific piping problem. This leading line includes more than 4000 items in all piping materials, schedules and sizes to match *your* design . . . available promptly through your nearby Tube Turns' Distributor.

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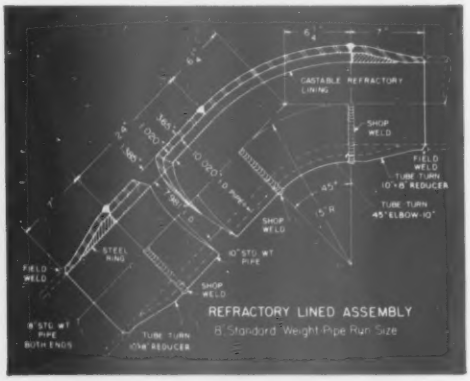
This application is practical for piping of 4" through 12" diameter. Minimum thickness for casting of refractory is about one inch. It should be confined to mild pressure-temperature conditions. Additional details are available from Tube Turns' Engineering Service Division.



Design of 45° directional change with refractory-lined elbow.

YOUR SIZE: These ½-inch and 42-inch TUBE-TURN Welding Elbows are the extremes in the range of diameters available out of stock in carbon steel. Tube Turns' complete line of more than 4000 items includes fittings and flanges in carbon steels, stainless steels, chrome-moly steels, copper, aluminum, brass, monel metal, nickel and wrought iron.

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Low Temperature Silvaloy Brazing is helping to speed production, lower costs and improve results for manufacturers in many fields. Call the Silvaloy Distributor in your area for complete information — or ask him for technical assistance. A Silvaloy Technical Expert will be sent to your plant at once, without cost or obligation.

The arrows point to the Silvaloy-brazed joints.

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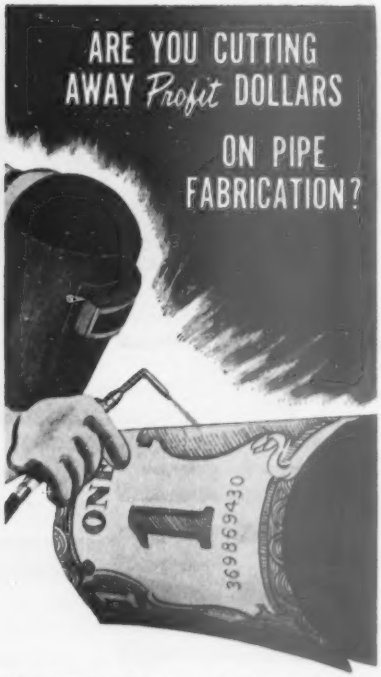

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fastener which locks the H & M securely in place; light the torch, adjust the flame and give the crank a few turns — THAT'S ALL, the job is done and you have a perfect, accurate cut, less reject welds assured. For more detailed information —

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SUBMERGED-ARC FIXTURES

(Continued from page 38)

one of the two oven floors, and the shell of the furnace was moved to cover that section. The furnace door was lowered at one end and the other end was sealed until the stress relieving had been completed on the first section. The same treatment was then given to the other end, after which the pressure vessel received a hydrostatic testing. In this case, the testing was probably around 250 psi, depending on the specifications. A smaller vessel might be tested up to 1,000 psi.

The seams of each pressure vessel are also X-rayed to check for possible flaws and insure that all welds will be perfect.

Submerged-Arc on Tanks

The company has also adapted submerged-arc welding to the construction of very large tanks such as the 80-ft-diameter water tank pictured in photos 8 and 9. At the top of photo 8, as part of the welding fixture, there are two wheels that travel along the top edge of the 3/8-in. tank wall. The welding head is suspended from this motor-driven unit, and the horizontal seams can be submerged-arc welded at speeds ranging from 36 to 42 ipm. Vertical seams, however, are still welded manually.

The particular tank has a roof that was pitched 1½ in. to the foot (photo 9)

Even though 75% of the company's welding is done by submerged-arc, manual arc welding is still important. There are 110 d-c welders for this work, mostly 300-600 amp, which are engaged in shop fabrication and at field sites. Electrodes are purchased in carload lots. For flame-cutting, the company has seven carriage-type machines and 15 hand torches. Three inert-gas welders take care of whatever aluminum or stainless-steel welding is to be done.

Naturally, American Pipe & Steel Corp. is equipped with all types of modern machines for work handling. There are large bridge cranes, monorails with hoists, jib hoists and numerous lift trucks. On its 8½-acre site at Alhambra, the company has a production area of 87,000 sq ft under roof and another 100,000 sq ft for warehouse and office space. Of its 350 employees, about 250 are engaged in production and 31 in engineering activities.

The company was started in 1902 under the name of the Tallerday Mfg. Co. to produce riveted steel pipe and other fabrication for agriculture. It had one medium-sized building and an adjoining blacksmith shop. At that time West Alhambra, then called Dolgeville, was being "converted" from a vineyard and winery into an industiral center. An old brick building, previously used for storing wine, was turned into a felt factory, and the vineyard acreage blossomed into steel fabrication.

As one of the first steel fabricating companies in all of Southern California, Tallerday manufactured and installed irrigation pipe and water tanks. It made and installed the first water pipe system for the nearby city of El Monte and placed its products in ranches and cities from Ventura to San Diego, ofttimes hauling pipe by muleback over the mountains and generally waiting for payment until harvest time.

Then came the oil boom. With its recognized experience in the manufacture of steel pipe and tanks and its "know-how" in field erection, the company's services were in immediate demand in this then new field. With the advent of liquid petroleum gas, it originated the "Red Head" L.P.G. systems and pioneered the development of bulk truck transportation. Welding was fast becoming a prominent factor in the company's production operations.

In 1906, at the death of Mr. Tallerday, the company changed management but continued to produce the same items with the same facilities. Two years later it was sold again, and the name was changed to the American Steel Pipe & Tank Co. Southern California was beginning to expand industrially and the new owners had the foresight to prepare for this expansion. New products, such as water well casing, bolted and welded steel storage tanks, pressure tanks and special oil field equipment were added in rapid succession. The expansion was so marked that in 1929 it was decided to incorporate under the present name—American Pipe & Steel Corp.

During World War II and the Korean conflict American devoted a large part of its engineering and production skills as a prime and sub contractor for government agencies.

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on the job . . .

Nelson Stud Welding photo

Numbered board facilitates stud welding

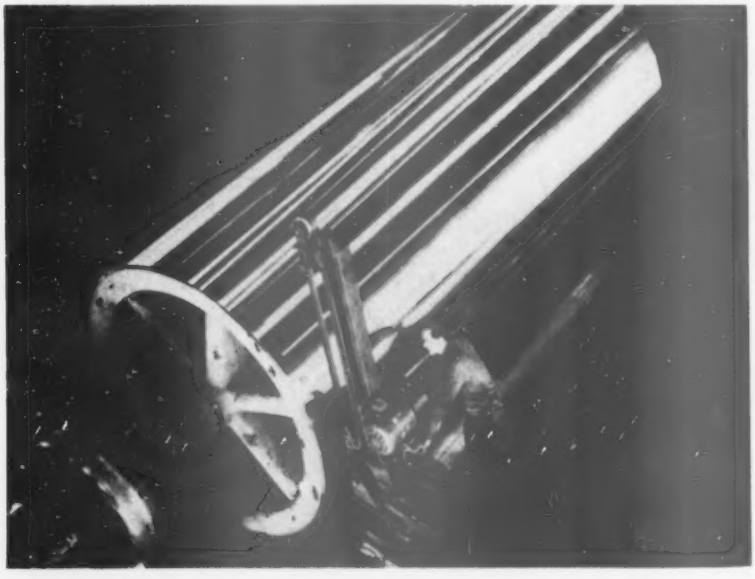
TO FASTEN electrical components on control boxes and panels of many sizes, the Clark Controller Co., Cleveland, uses approximately 50 different kinds of end-welded studs. Frequently only a small number of studs of a particular type are welded before changing to another style. Yet the stud welding is so arranged and organized that there is almost no lost time or motion in shifting from one type of stud to another.

Samples of the most commonly used studs, with their identification numbers, are mounted on a board hanging near the workbench. The templates used for precision work are hung neatly on hooks along one side of the stud-welding area. Nearby bins contain quantities of each stud, the bins being numbered to correspond with the numbers on the sample board. The various chucks required are inserted, when not in service, in holes in another board. Underneath the workbench are bins with different ferrules.

As a final step in good housekeeping at Clark, broken pieces of used ferrules are swept with a hand brush into a wide, funnel-like chute. The debris falls into a bucket instead of cluttering up the floor.

Stud welding has brought savings of as much as 500% in production time, according to C. L. Benjamin, manager of component parts manufacturing.

* * *



A pressing service for carpets

Pressing service for carpets

THIS 28-ton steel drier roll will be used by the C. H. Masland Co., Carlisle, Pa., as a giant ironing machine to press and dry broadloom carpets. It is 8 ft in diameter and 19 ft long—one of the largest drier rolls ever made. It was built by Lukenweld, a division of Lukens Steel Co., Coatesville, Pa.

Because of the size of this roll, it had to be specially designed structurally. The design pressure was 50 psi; the design temperature 650 F. The roll was built of fabricated steel plate in accordance with the ASME Code for Unfired Pressure Vessels, Paragraph U-69, the 1949 Edition. It includes a jacket formed by two concentric cylinders, supported on each end by oblong spokes that join the support trunnions. The inner and outer cylinders were made up in two courses each. The outer cylinder was 1⅜ in. thick, while the plate of the inner cylinder was ⅞ in. The roll weighed 66,000 lb before machining.

The spokes were designed from two pressed-plate sections, automatically welded together, and included welded stays. Shroud plates were employed on the ends for safety and to establish a uniform heat balance inside the roll. All material used in the roll was in accordance with ASME requirements. Most of the plate material was A-285, Grade C steel, while the trunnions were A-266, Grade 2 forgings.

Automatic submerged-arc welding was used wherever possible—in the main seams of the cylinder and in combination with hand welding on the circumferential seams. All welding was positioned by using horizontal electrically-driven positioners. Welding procedures and operators were suitably qualified under ASME standards.

Main seams of the outer cylinder were X-rayed, and the completed weldment was stress-relieved according to ASME requirements. Finally, the rough plate surfaces were grit blasted.

* * *

Accurate pipe marking

IN CUTTING and assembling pipe for jig building, weldors at Temco Aircraft Corp., Dallas, Tex., had found it difficult to hold accuracy when making lengthwise cuts on long pieces of pipe. Weldor Charles Gonday, of 9007 Diceman Drive, Dallas, found the answer at a cost of only $5.

The tool he designed is an aluminum V-block 4½ in. wide. He at-

MARKING a point 17° off centerline

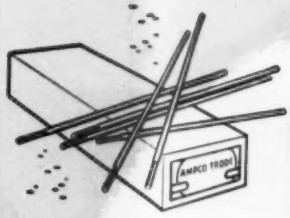
tached a plate to one end of the V-block and mounted a 10-cent protractor on it. The other ingredients are a movable metal pointer, a 2½-in. "bubble" and a prick punch. The pointer is fixed to sweep across the face of the protractor, the bubble is mounted to move with the pointer, and the punch is inserted at the point of the V and in line with the 90-degree mark on the protractor.

To establish a centerline on horizontal pipe, Gonday sets the protractor pointer at 90 degrees and places his V-block on one end of the pipe. He adjusts the block until the bubble is centered and then taps the punch. This marks one end of the centerline. Gonday repeats the operation at the other end of the pipe and connects the two points. The line thus drawn is used as a guide line.

To cut out a quarter section of the pipe lengthwise, Gonday moves the pointer to either zero or 180 degrees and slides the block around the curve of the pipe until the bubble is again centered before he taps the punch.

This procedure—repeated at the other end of the pipe—provides the two terminal points for the second guide line. The lines are exactly 90 degrees—one quarter of the pipe's circumference—apart. The same procedure is used to halve or otherwise section a pipe lengthwise.

Flat metal pieces called "pads" are often used to position or support assemblies made of pipe. The pads must often be attached to the jigs at a precise number of degrees off horizontal. Gonday simply sets the pointer to register the required number of degrees and centers his V-block bubble. In the picture above, he is preparing to mark a point some 17 degrees off the centerline with a stroke of the punch.



Make high-strength, crack-free welds — even on difficult and dissimilar metals

Use all-purpose

AMPCO-TRODE* 10 electrodes

HERE'S the electrode that makes many difficult welding jobs a snap. Ampco-Trode 10 gives you strong, crack-free, ductile welds on iron-base metals and alloys — malleable iron, cast iron, manganese steel, tool steel, galvanized, etc. It joins materials such as copper alloys — aluminum bronze, silicon bronze, manganese bronze — and nickel alloys quickly and easily. It lets you join many dissimilar metals — cast iron to steel, cast iron to bronze, bronze to steel, etc. — and deposition rate is fast, too.

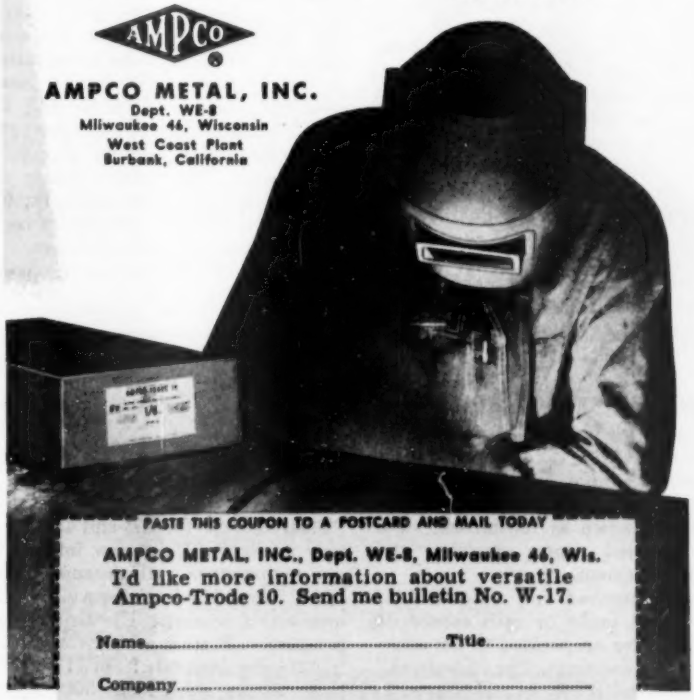
Versatility? You really get it with Ampco-Trode 10. You make intermediate hardness (130-150 BHN) overlays and inlays that have excellent bearing qualities and high resistance to all forms of wear — metal-to-metal, erosion, cavitation-pitting, etc. The deposit resists corrosion from salt water, acids, mild alkalies.

Get convenient Ampco-Trode electrodes in all sizes 3/32" to 5/16", 11" to 18" lengths. Filler rod and wire also in stock for other welding processes. Be set for those tough welding jobs. Order Ampco-Trode 10 today.

*Reg. U. S. Pat Off.

AMPCO®

AMPCO METAL, INC.
Dept. WE-8
Milwaukee 46, Wisconsin
West Coast Plant
Burbank, California



PASTE THIS COUPON TO A POSTCARD AND MAIL TODAY

AMPCO METAL, INC., Dept. WE-8, Milwaukee 46, Wis.
I'd like more information about versatile Ampco-Trode 10. Send me bulletin No. W-17.

Name..... Title.....

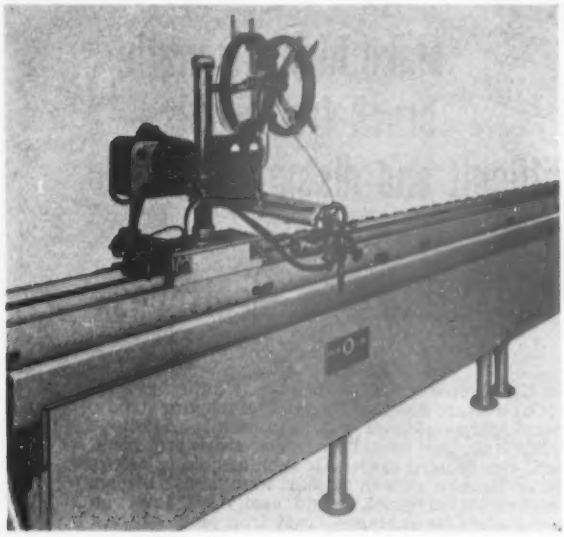
Company.....

Company Address.....

City..... ( ) State.....

W-17A

New products . . .



WELDING power is supplied by constant-potential unit

CONTROL panel is located at generator end of welder

Hardfacing machine

DESIGNED primarily to rebuild or hardface extra heavy and large sections, such as cat tracks, shovel pads, etc., the "K-10" can weld 1 to 100 in. of bead per minute. It can also be used to fabricate large sections, e.g., pipe, *I* beam and structural pieces.

Table is 30 ft long, 32 in. wide, 7 in. deep and stands 32 in. from floor. Low carriage facilitates easier loading from either side. Variable-speed motor and adjusting wheels permit stepovers as small as 1/64 in. and a fine vertical adjustment. The unit has an automatic submerged-arc welding head and simplified control panel. Welding power is supplied by a 625-amp constant-potential unit. The head can be swung 360 deg.

MIR-O-COL ALLOY CO., 308 N. Avenue 21, Los Angeles 31.

* * *

Roof for welded house

FOR use with lightweight welded steel frameworks for homes, commercial buildings, schools, etc., new incombustible roof material has been developed. Known as "Insulrock," it is manufactured from excelsior and Portland cement.

Usual method of construction: lightweight bulbs or rails spaced 33 in. on center are welded to the structural roof members. The "Insulrock" slab material is laid in and clipped to the bulb tee, after which a standard built-up roofing is applied. Factory noise, a constant annoyance to management and labor, is said to be materially reduced.

INSULROCK CORP., East Linden Ave., Linden, N. J.

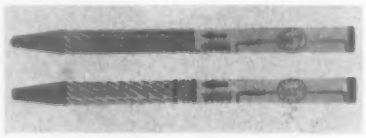
* * *

Portable X-ray unit

"BALTOGRAPH" is new line of portable industrial X-ray equipment that is said to feature maximum penetration for minimum weight. Self-contained X-ray head of the model rated at 195 kv weighs 153 lb and measures 26½ in. by 14 in. by 8¼ in. Head houses both X-ray tube and high-voltage transformers of radical new design. All models operate directly from 110-volt or 220-volt, 60-cycle lines. They do not require cooling pumps or special accessories.

BALTEAU ELECTRIC CORP., Stamford, Conn.

* * *



Temperature indicators

"TEMPILSTIKS" for 463 and 488 F are now available. These new intermediate temperature ratings supplement the 413 and 438 F sticks, which were announced recently. The firm's temperature indicators are now available in 12½-deg intervals from 113 to 500 F, in 25-deg steps from 500 to 550 F, and in 50-deg intervals from 550 to 2,000 F.

TEMPIL CORP., 132 W. 22nd St., New York City 11.

D-c welder

FOUR-cylinder, air-cooled engine is the power source for this new 250-amp, d-c arc welder. The generator is of "Multi-Range" type connected to industrial-type Wisconsin "Model VF4" engine.

Convenient control panel is located at generator end of the unit. Mounted on it are the larger range wheel, volt-amp adjuster knob, reinforced bus-bar type cable terminals and power outlet receptacles, as well as starter button for a battery-equipped unit.

Power-outlet receptacle is provided for use only when unit is not being used for welding.

HOBART BROTHERS CO., Dept. 205-h, Troy, O.

* * *

Welding clamps

SAID to take less than 10 seconds to adjust, "Fast-Action" *C* and tooling clamps are said to be ideal for use in welding. Clamping is effected by wedge-clamp action of an elliptical, which will not dip or bite into plunger. Plunger is thrust against the object to be held, and the desired pressure is achieved by operator turning handle. Full leverage is instantly obtained.

Holding pressures range from 1,500 to 4,000 lb, depending on style and size. Conventional *C* clamp available in 3, 4, 6, 8, 10 and 12-in. sizes. Tooling clamp is made in standard thrust sizes from 3 to 12 in.

HALLWELL TOOL CO., 606 S. Hill St., Los Angeles 14.

turn to CRUCIBLE REXWELD low hydrogen coated electrodes for superior welding characteristics

Crucible Rexweld low hydrogen coated electrodes provide greater ease of application. Welding can be done efficiently in both vertical and horizontal positions. And you get denser welds — less porosity, when you use Rexweld.

So, to simplify the hard-facing of hardenable steels, extend the life of parts, and cut operating costs, use Rexweld. Your nearest Crucible warehouse has Rexweld low hydrogen coated electrodes, and bare rods, in a wide assortment of sizes and grades to meet all your needs.

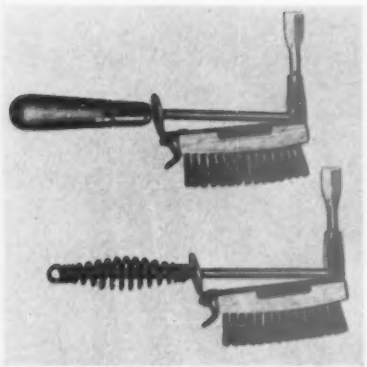
CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

REXWELD HARD SURFACING RODS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MAX-EL • SPECIAL PURPOSE STEELS



Chipping hammer

REPLACEABLE bits, either cone or chisel, are now also available with "Dual Tools," which were recently redesigned. New frame construction is said to be far more rigid and has better brush angle and easier brush replacement.

Chisel bit can be inserted straight or as a cross chisel. When bit is worn out, it can be drifted out and replaced. The tool is available with either wood or metal handle.

ATLAS WELDING ACCESSORIES CO., 707 E. Lewiston, Ferndale 20, Mich.

* * *

Saw-blade welder

WELDER that butt welds all saw blades from 1/16 to ¾ in. has been improved with larger, heavy-duty transformer. This is said to insure a more uniform weld. Another improvement is inclusion of larger grinding unit with a 50% more powerful motor. Unit permits a wide range of work from intricate tool and die to power cut-off saws.

Weighing only 35 lb, portable "Bren/Weld" welder is 7¾ by 12 in. by 7 in. Operates on 110 volts, 60 cycles.

KASSON DIE & MOTOR CORP., 32-14 Northern Blvd., Long Island City 1, N. Y.

All-position electrode

"PHOS-BRONZE" is new line of electrodes for use in welding brass, bronze, copper, cast iron and steel in all positions. Because of their strength, corrosion resistance, low-melting point and ease of application, these electrodes are said to be unequalled for welding copper alloys.

Manufacturer states that heavy, black protective coating causes metal to pass through arc steadily in same manner as conventional shielded-arc electrodes. This special original coating is said to provide a softer, stable arc and to lower spatter.

PACIFIC WELDING ALLOYS MFG. CO., 310 Avenue 21, Los Angeles 31.

* * *

Welding transformer

SMALL compact transformer unit is for portable, multiple-point, package-unit and indirect-series welding applications. It is said to exceed minimum requirements for J.I.C. Standards for Type 1-A transformers. Advantages claimed by manufacturer: compact size, which lowers cost of weld, and less power loss because it can be placed closer to the weld.

SCIAKY BROS., INC., 4915 W. 67th St., Chicago 38.

* * *

Safety shield

SAFETY welding shield is portable and will stand formed in any position around the job. It can also be used as portable protection on power chipping, grinding and chiseling operations. Shield has an all-welded, 14-gage, galvanized wire fabric insert. The heavyweight, fire-resistant treated fabric carries Underwriters' approval.

FROMMELT INDUSTRIES, P. O. Box 165, Dubuque, Iowa.

Arc stabilizer

SPECIFIED for either metallic-arc or inert-gas shielded welding, improved "Model No. 13-D Missing Link" high-frequency, automatic arc stabilizer is now adaptable to any a-c or d-c machine. It now has a universal circuit requiring no auxiliary switch. Continuously variable intensity control permits precise adjustment for any high frequency necessary on various welding applications.

MID-STATES WELDER MFG. CO., 6025 S. Ashland Ave., Chicago 36.

* * *

Current integrator

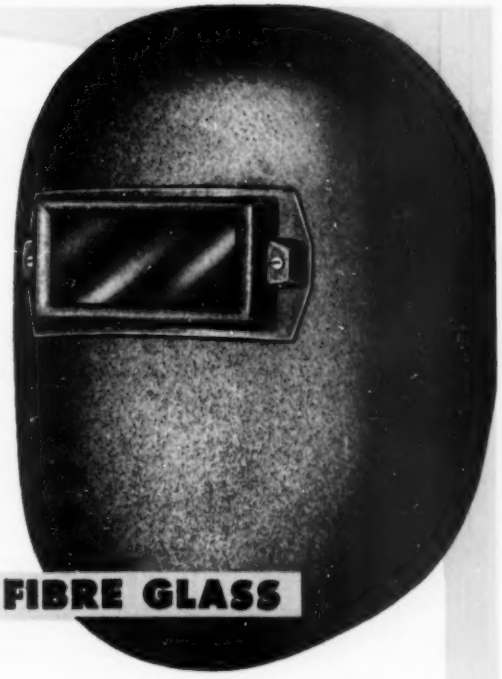
DEVELOPED for the resistance-welding industry, the "Sci-Tron" is an electrical device that provides two points to which an oscilloscope or oscillograph may be connected to observe the welding current.

The instrument provides the two points required to find a faithful reproduction of the welding current, according to manufacturer. The welding current waveform can be observed when the device is placed in the throat of the welder and attached to output terminals of the oscilloscope or oscillograph.

Dimensions are 6¾ in. long by 4⅝ in. wide by 3½ in. high. Weight is 2¾ lb.

VENUS PRODUCTS CO., 5057 S. Ashland Ave., Chicago 9.

for cost-conscious purchasers of welding accessories



PENOPTIC WELDING HELMETS

A Model For Every Welding Operation
Every Model At Direct-To-You Savings

Penoptic welding helmets are ruggedly constructed to assure best performance under severest conditions . . . priced lower under Penoptic's streamlined, manufacturer-to-you distribution policy. Both the fabricated and one-piece molded shells are heat and flame-resistant, non-reflecting and amazingly lightweight. Whether you choose stationary or lift-front lens holder you get "light-tight" construction that seals out all glare and injurious rays. In headgears, you have a choice of standard or ratchet type adjustment . . . both positive-locking . . . both equipped with genuine leather, felt-padded sweatbands. Penoptic filter plates that meet Federal Specifications are standard equipment on all models.

For prices and full information write Pennsylvania Optical Company, Reading, Pa. or 1712 *Taraval St., San Francisco* 16, *Cal.*

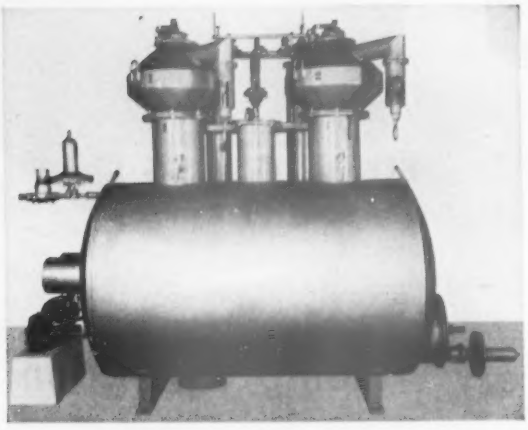
PENNSYLVANIA OPTICAL COMPANY

READING, PENNSYLVANIA

Known For Fine Ophthalmic Products Since 1886

designed for

modern acetylene production



Sight Feed

MODEL A-TWIN GENERATOR

for pipe-line distribution

If you're modernizing present shop facilities or enlarging acetylene production, investigate the Model A-Twin Generator. When requirements demand, acetylene can be produced continuously, without necessity of shut-down during recharging. Operation is safe and virtually automatic, requiring a minimum of attention and maintenance. No tank purging... No waste of acetylene.

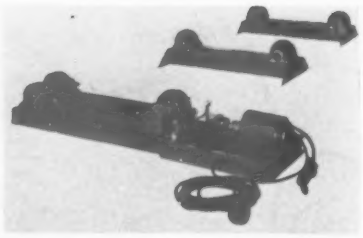
Your welding supply distributor will be glad to discuss the economy and convenience of the Model A-Twin with you. Ask him for literature and our print No. 210-10-A, suggesting arrangement of a Model A-Twin and pipe-line system in your plant. If unavailable locally, write or phone

WELDING Sight Feed EQUIPMENT

THE SIGHT FEED GENERATOR CO.

55 East Third St.

WEST ALEXANDRIA, OHIO, U.S.A.



Turning roll

SPEED range on new turning roll is 0 to 60 ipm. With two idlers, turning capacity is 1,500 lb. The unit is recommended for use in automatic and manual arc welding, cutting, etc.

UNIQUE TURNTABLE & EQUIPMENT CORP., 1125 Irving Ave., Glendale, Queens, N. Y.

* * *

Double-action clamp

THESE clamps have been designed especially for the welding industry to facilitate clamping of workpieces where surfaces are obstructed by overhanging portions, such as on *I* bars and *T* bars. Both jaws are provided with full-length spindles, permitting a 3½-in. thrust.

Welding torch has access to any portion of the workpiece because the clamp can be moved out of the way by simply rotating it about its spindle axis. These "Double-Action" clamps are available in throat depths of 4, 5 and 7 in. Maximum jaw openings range from 8 to 36 in.

WETZLER CLAMP CO., 43-15 11th St., Long Island City, N. Y.

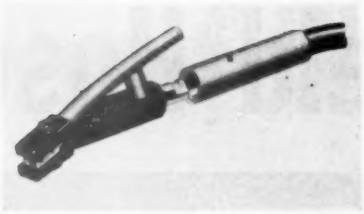
* * *

Respirator

AIRBORNE radioactive matter and other toxic rust, mist and fumes are removed by "Super Micro-Toxisol" respirator. Effective filtering area of 45 sq in. is contained within compact unit that does not interfere with wearer's vision. Each unit is contained in lightweight aluminum cartridge, which both protects filter while in use and eliminates all possibility of damage in installation.

Respirator facepiece takes two filters, providing total filtering area of 90 sq in.

AMERICAN OPTICAL CO., Safety Division, Southbridge, Mass.



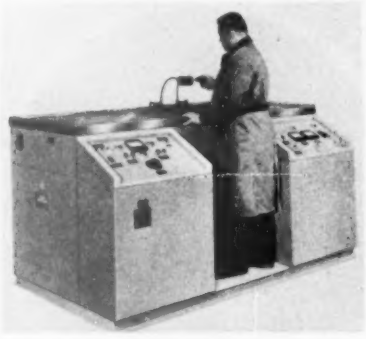
Electrode holder

Two new "Quick-Disconnect" welding-electrode holders eliminate need for whips, whip ends or any mechanical or solder holder connections. Built-in cable connector permits connection to any cable end with addition of inexpensive "Cam-Lok" female connector.

Holders are pug nose and straight nose units. Both feature simple, one-hand operation, according to manufacturer.

CAM-LOK DIVISION, Empire Products, Inc., P. O. Box 98, Cincinnati 36.

* * *



Induction generator

DESIGNED specifically for production-line operation, the "Kilotron" is a high-frequency, induction-heating generator that can be used for brazing, heat treating, etc. Two models have rated outputs of 10 and 20 kw. Console cabinet has 33 by 100 in. work table. Control is manual or automatic, and provision has been made for remote control.

ELECTRIC ARC, INC., 152 Jelliff Ave., Newark 8, N. J.

* * *

Ignitron

EQUALLY effective on cooling systems using raw water or on recirculating systems, a new Size B ignitron utilizes a new protection system that depends entirely upon tube temperature and is similar to the thermal protection built into motors.

Designated the "NL-1051," the tube has provisions for thermostat mounting and may be used to replace any Size B ignitron.

NATIONAL ELECTRONICS, INC., Geneva, Ill.

Page Welding Wire

Now—a new line-up of PAGE welding wire in coils, reels, packages

• Here are some of the ways PAGE welding wires are packaged to protect them during shipment and to make it easy for you to handle and stock them. Two new packages are Leverpaks and pallet-mounted coils.

LEVERPAKS • Here's one of the best containers for coils up to 16" ID. It's light-weight, but durable. It is sealed air-tight and is packed with moisture-absorbing substance to reduce corrosion. Release safety catch, pull lever, and the whole top comes off. It's just as quickly resealed. Leverpaks can be rolled easily. They stack perfectly and take a minimum of floor space. They cost you nothing extra and have many re-uses.

PALLET-MOUNTED COILS • If you have a fork-lift truck, you'll like PAGE'S new pallet-mounting of 22" ID coils. Steel strapping and paper wrapping protect coils and hold them securely. You can run them in and out of freight cars and trucks, and spot them in your plant.

AUTOMATIC WELDING WIRES • **Inert Gas**—Six PAGE-ALLEGHENY stainless grades in .035", .045", and .0625" diameters. Precision thread-wound on 25-lb. non-returnable reels to fit popular arc welding machines. **Submerged Arc**—PAGE Stainless in wire diameters from 1/32" to 5/16", plain or copper coated. In layer-wound coils or 22" or 24" mill coils.

GAS WELDING RODS • In a variety of analyses: stainless, Armco, medium and high carbon, and manganese or naval bronze.

Warehouse stocks in Chicago, Denver, Houston, Los Angeles, San Francisco

Write our Monessen, Pa., office for literature and prices

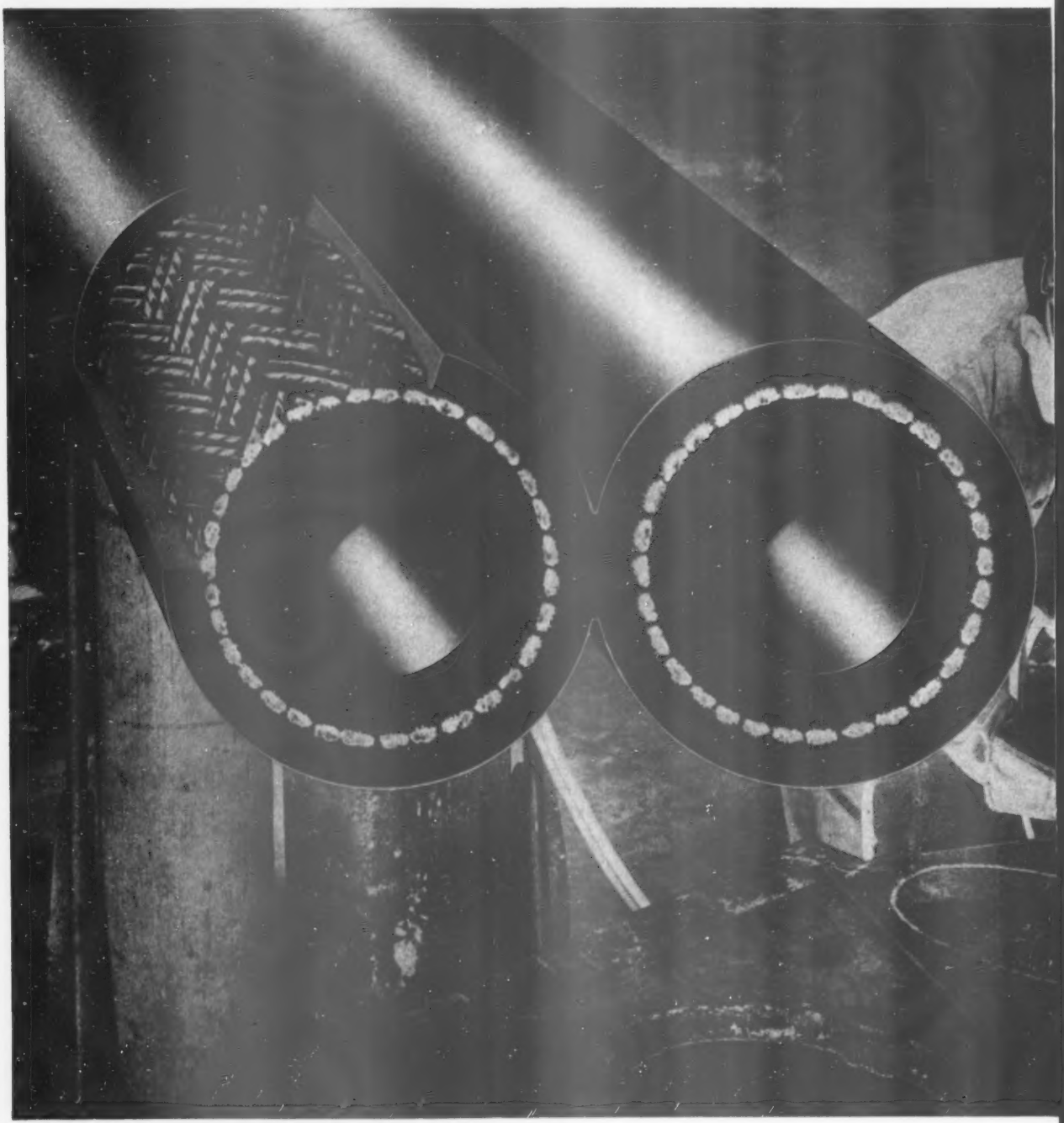
ACCO

Page Steel and Wire Division

AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

Safer Twin-Weld® Hose



HEWITT-ROBINS

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

Won't Writhe or Twist

Hewitt-Robins Twin-Weld—the original Twin-Line Welding Hose—Offers Values Found in No Other Hose... Single or Double Line!

Here is the safest, easiest-handling welding hose that money can buy. Twin-Weld—*the original twin-line welding hose*—won't writhe or twist on the job as other welding hoses do because it's "straight-cured". Its two lines are firmly bonded together, easily separated for making connections. Twin-Weld is non-porous . . . eliminates welding inefficiency, explosions and fires.

For greater safety and maximum flexibility... longer welding hose life ...buy Hewitt-Robins Twin-Weld.

ENGINEERING DATA

TUBE: Non-porous, smooth tube for full free-flowing of gases at all times.

CARCASS: Now reinforced with a single braid of high-tensile rayon yarn, applied with special braiding equipment . . . equal in strength and fabric content to the highest quality two braid hose.

COVER: New flame-resistant, oil-resistant cover made from premium quality synthetic compound that won't become hard or brittle. Surface is smooth . . . won't crack, peel or discolor . . . resists abrasion of sharp metal, heat, grit, dirt and ozone checking. For quick, positive identification oxygen line is green—acetylene line is bright red.

SIZES: O.D.'s now conform to IAA specifications—7/16", 17/32", 19/32" . . . I.D.'s 3/16", 1/4", 5/16".

WORKING PRESSURES: Up to 200 psi.

Here is a partial list of

HEWITT-ROBINS PRODUCTS

that will help you cut handling costs and increase operating efficiency.

MACHINERY

Belt Conveyors
Belt & Bucket Elevators
Car Shakeouts
Conveyor Idlers
Dewaterizers
Mechanical Feeders
Foundry Shakeouts
Mine Conveyors
Reclaiming Systems
Screen Cloth
Stackers & Trippers
Vibrating Conveyors & Screens

INDUSTRIAL RUBBER PRODUCTS

BELTING:

Conveyor
Elevator
Transmission

HOSE:

Acid
Air & Air Drill
Barge Loading
Dust Suction
Fire
Fuel Oil & Gasoline
Gasoline Pump
Mud Pump Suction
Oil Suction & Discharge
Propane-Butane
Road Builders'
Rotary Drilling
Sand Blast
Sand Suction
Sea Loading
Servall®, All-Service
Steam
Tank Car & Tank Truck
Vacuum & Air Brake
Water & Water Suction
Welding, Twin-Weld®

•

For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber Products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.

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INCORPORATED

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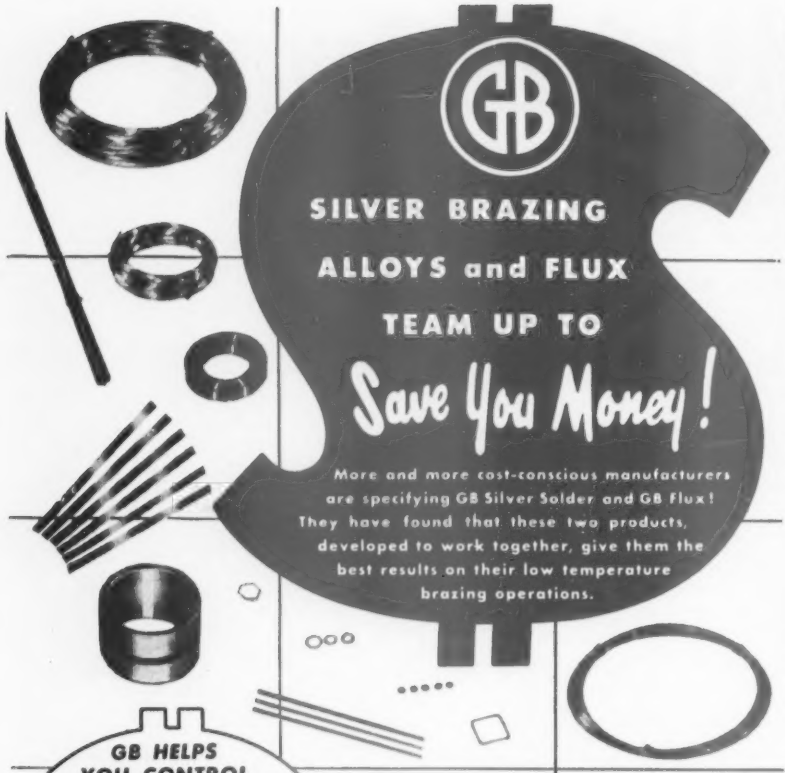

SILVER BRAZING
ALLOYS and FLUX
TEAM UP TO
Save You Money!
More and more cost-conscious manufacturers are specifying GB Silver Solder and GB Flux! They have found that these two products, developed to work together, give them the best results on their low temperature brazing operations.

GB HELPS YOU CONTROL THESE COST FACTORS!

SPEED
HEATING
MATERIAL
LABOR
CLEANING
FIT-UP
PREPARATION

GB Silver Solders are available in six standard alloys—each developed to meet specific cost and production requirements. All are available in the most convenient form to meet your needs—wire coils or straight lengths, strips, sheets or formed pieces.

GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

And, if you require a special Silver Solder, Goldsmith's Technical Service Division is ready to give you competent assistance—their recommendations will be backed by 80 years of experience in alloying and refining precious metals.

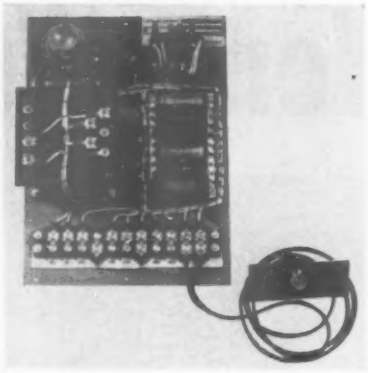
GB FLUXES

Produced under strict laboratory control, GB Fluxes are fully active, deep penetrating, stable and economical. While developed primarily for use with GB Silver Solders, they produce high quality joints with any good silver solder.

GB DATA BOOK

Here's down-to-earth information on the important phases of low temperature brazing. You can get a free copy from your GB Distributor—Write us and a copy will be forwarded to you.

GOLDSMITH BROS. SMELTING AND REFINING CO.
1304 W. 59th Street, Chicago 36, Illinois
Suppliers of Precious Metals to Industry Since 1867

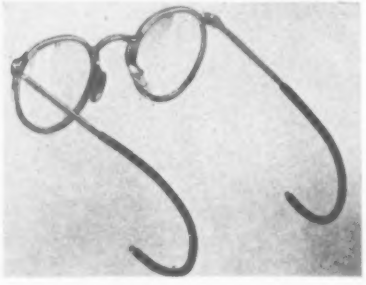


Water control

To PROTECT costly equipment and save cooling water where it is in short supply are the purposes of this water-saving control. The automatic control starts the water flow as soon as welder begins a sequence. If sequence is not repeated after three minutes, water is shut off and a neon panel is lit.

THE TAYLOR-WINFIELD CORP., Warren, O.

* * *



Safety spectacles

METAL-framed, lightweight "Saf-I-Spectacle" has soft polythene nose pads that are said to mold gently to contours of the nose and distribute weight lightly without pressing or gouging. Can be furnished with perforated, non-corrosive metal side-shields for side protection.

UNITED STATES SAFETY SERVICE CO., 1215 McGee St., Kansas City, Mo.

* * *

Rectifier tube

MERCURY-vapor rectifier tube, "Type 6508," is said to have long life in relatively high-current and voltage operation. It is intended to be used instead of standard tubes that have not been used in many industrial applications because of initial and replacement costs.

This rectifier has a peak inverse voltage rating of 21 kv, voltage drop of 14 volts. Cathode is directly heated, oxide coated.

AMPEREX ELECTRONIC CORP., 230 Duffy Ave., Hicksville, L. I., N. Y.

REDUCE SNAGGING COSTS

with Cincinnati (PD) Grinding Wheels

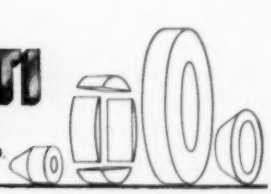
Through the CINCINNATI (PD) Manufacturing Process, you can be *positive* that *every* CINCINNATI (PD) Wheel you order for stand, swing frame or portable grinders will be produced repeatedly to the exact CINCINNATI grading specified for your job.

Just as a negative guarantees exact duplication of a photograph, the CINCINNATI (PD) *Manufacturing Process assures a* POSITIVE DUPLICATION *of the original wheel EVERY time you reorder. Yet* these better, cost-cutting–CINCINNATI (PD) Wheels *are priced no higher than ordinary wheels.*

Positive Duplication (PD) is the result of extensive manufacturing research and the development of new standards of manufacture with 36 quality control steps. "On grade" with a CINCINNATI (PD) Wheel means all future (PD) Wheels will act and grind exactly alike –providing the *same fast cutting* of the original wheel, the *same long wheel life*, the *same reduced operator fatigue* and the *same self-dressing action.*

CINCINNATI (PD) Wheels are made in vitrified and resinoid bonds for ferrous and non-ferrous foundries and weld shops. They are available in a complete variety of popular sizes and shapes. We'll be happy to tell you about our complete line of straight wheels, cups, cones and plugs, and to prove to you how CINCINNATI (PD) Wheels will make money for you. Just contact us and we'll send one of our representatives. Wire, write or 'phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



Seam welders welding aircraft parts

BUILDING RESISTANCE WELDERS INTO PRODUCTION LINES IS A TAYLOR-WINFIELD SPECIALTY

● How many welders do we need? What KVA for each operation? Press welders, projection welders, seam welders, butt welders? What type of operation? Why not call on the experience of Taylor-Winfield?

Taylor-Winfield can supply specific information about your production. For this practical help, "Call in T-W" and gain the benefit of facts, figures and experience with resistance welding.

Phone or write the nearest T-W district sales and service office.

Resistance Welders Since 1898

Sales and Service

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OAKVILLE AND WINDSOR, ONTARIO

TAYLOR-WINFIELD
RESISTANCE WELDERS

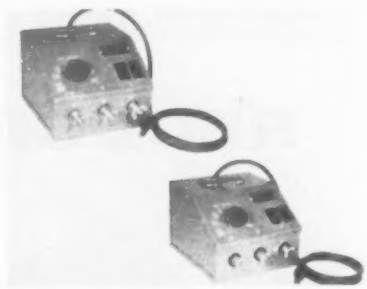
THE TAYLOR-WINFIELD CORPORATION WARREN, OHIO

Electrode holder

NEW 14-oz, 300-amp "Caddy Cub" electrode holder is said to be first with molded glass fiber, reinforced plastic handle. Manufacturer states this gives handle high tensile strength and makes it impervious to moisture, arc radiation and mechanical abuse. Handle's reduced contact area offers cooler operation. Operates continuous duty with 1/16-3/16 in. electrode intermittently with ¼-in. electrodes.

ERICO PRODUCTS, INC., 2070 E. 61st Pl., Cleveland 3.

* * *



Soldering power unit

IMPROVED models of line of resistance-soldering power units are enclosed in ventilated cabinet of heavy-gage steel with snap switch and pilot light. Three-way output terminals combined with a rotary switch provide 24 different controlled heats.

New units are "Model 105-B2" (500 watts) and "105-C1" (1,000 watts). Both are available for 115 and 230-volt, 50-60 cycle power supply.

WASSCO ELECTRIC PRODUCTS CORP., 126 W. Cass St., Joliet, Ill.

* * *

Hardfacing paste

ALL-purpose hardfacing paste has been developed especially for hardfacing thin blades such as plowshares, bean knives and disc blades. "Miracle Paste" is said to provide the optimum in wear and impact resistance as well as ease of application. Can be spread by any flat blade such as a spatula, putty knife, etc. Bonding application is by oxyacetylene or carbon-arc methods.

MIR-O-COL ALLOY CO., 312 N. Avenue 21, Los Angeles 31.

FINANCIAL AID TO HIGHER EDUCATION

What Business Can Do to Help Our Colleges and Universities

Is the financial squeeze now gripping our colleges and universities grave enough to warrant direct action by the business community? If so, what can business do about it? This editorial is addressed to these two questions.

In the previous editorial in this series of two, it was demonstrated that **our colleges and universities, and particularly the independent institutions, face financial difficulties, which, unless relieved, promise to get progressively worse and might ultimately result in a national disaster.** This state of affairs obviously gives the business community a crucial stake in helping to relieve the plight of these institutions. For our business organizations can be no stronger than the total community of which they are a part.

It does not follow automatically, however, that every business firm should give direct financial aid to education. Already the business structure is heavily burdened with activities unrelated to its main purpose. These include acting as tax collector for more than $65 billion of federal, state and local taxes in the year 1953. There is a limit to the amount of such public enterprise that can be loaded on the business system.

Business Holds Key to Answer

If, however, the survival of a key part of our educational system depends on its having financial help from the business community, that help should be provided. And this is the situation of our independent privately endowed colleges and universities.

Of course, our tax-supported institutions of higher learning must also be kept strong, financially and otherwise. But they have recourse to public support not available to the independent institutions. Largely on this account, their present financial difficulties are much less acute than those of the independent colleges and universities.

These independent institutions have seen price inflation eat away much of the value of their endowments. Moreover, there is no prospect that these endowments can be sufficiently replenished by gifts from the wealthy people who provided them in earlier years. Progressive income and estate taxes have seen to that. Thus, they are faced not only with a peculiarly acute financial problem, but also one which cannot be solved except by tapping other sources of aid.

Tax Support No Solution

It is conceivable that the independent colleges and universities might solve their financial problem by seeking support from tax revenues. If they did this, however, they would lose their distinctive character as independent institutions, and our system of higher education would lose one of its major elements of strength. That is the existence in our educational system of both independently financed and tax-supported colleges and universities. Each has its special contribution to make to a well-balanced system of higher education.

Business is directly dependent upon higher education to staff its increasingly complex and exacting operations. A key part in this process is played by the small, independent liberal arts colleges which are the hardest hit financially of all our institutions of higher learning. "These," states the Council for Financial Aid to Education, recently formed by a group of business leaders, "have contributed a high proportion of the intellectual, scientific and religious, as well as business leadership of the nation. Their programs are devoted to the teaching of values, particularly the values of freedom. They are a vital bulwark to our system of free enterprise."

Means of Providing Help

There are many means by which business firms can extend help to our colleges and universities. The most obvious, of course, is to make outright grants of money either to individual institutions or to groups of institutions for such uses as the institutions think best. Another means of help, increasingly employed by business firms, is to establish scholarships to pay the full cost of college or university courses of study. Sometimes the scholarships are open for general competition, sometimes they are limited to employees and children of employees of the firm granting them. Not infrequently those winning the scholarships spend some part of their school vacations working in the companies granting the scholarships.

A number of companies have recently provided for what have come to be called "scholarships in reverse." These companies pay a flat sum to a college or university for every one of its graduates they employ. Financing of university research programs also offers a broad avenue for financial aid to our universities by business.

Need Two-Way Communication

Some business firms have well-developed programs for financial aid to education. But they are exceptional. For most companies the problems involved are new and strange. These companies were created with the basic purpose to make money, not to give it away. Successful philanthopic operations involve a whole set of problems with which they have very little experience. Not the least of these is how to make business a dependable source of financial aid to education, since business has no assurance that the profits of one year will not be losses the next.

Considerations such as these emphasize the wisdom of a recent Industry-College Conference on aid to higher education by business, in making the first of its ten conclusions that "better communication, by direct contact, is needed for each [industry and the colleges] to understand the problems of the other." At this juncture the creation of mutual understanding is much more important than the raising of some money and letting it go at that. The problem of aid to education by business has its immediate urgency, but there is also a long-range program to be developed on which business and the colleges and universities must pull together in the years ahead to find a satisfactory solution.

As stated at the outset, failure to find a satisfactory solution could result in a national disaster. This means that, **to give proper heed to their own future prosperity and the future welfare of the nation, business firms generally must go to work on the problem of financial aid to higher education. They must go to work first, to understand the problem; second, to establish two-way communication with our colleges and universities about it; and third, to develop a program which pays proper heed to the needs and capabilities of both business and higher education.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

AUTOMATIC TORCHES

THE HEART OF ECONOMY

Approved by Underwriters' Laboratories

BY ACTUAL COMPARISON

USING NON-AUTOMATIC TORCH . . . . . 12 Pieces Welded
USING NON-AUTOMATIC WITH GAS SAVER . . 18 Pieces Welded
USING HARRIS AUTOMATIC TORCH . . . . 28 Pieces Welded

Using the same amount of Oxygen and Acetylene for each set-up, this "Actual Comparison" Demonstration proved the Harris Automatic Torch to be a profitable investment for economical and efficient welding work.

Let our local Distributor show you the "Actual Comparison" test in your plant and explain quickly and simply why the Harris Automatic has the greater piece production at the lowest cost.

ALMOST 50 YEARS OF "KNOW-HOW"

Harris is the originator of the "Automatic" Torch and with almost 50 years of building "Know-How" behind every torch, the buyers and users get tremendous returns on their torch investment.

Harris' long established Distributors, located in all principal cities in the United States and Foreign Countries, are at your service.

HOME OF AMERICA'S FIRST AND FINEST GAS WELDING AND CUTTING APPARATUS.

THE HARRIS CALORIFIC COMPANY

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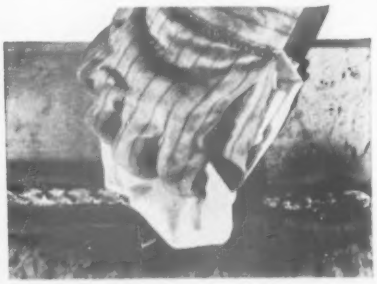
HARRIS

SERVING THE METAL INDUSTRY SINCE 1905



cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time — P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. $3.25 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of sub-assemblies. $3.30 per gallon, f.o.b. Dayton.

MONEY-BACK TRIAL OFFER

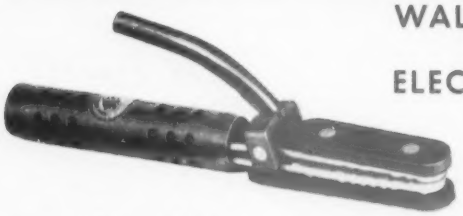
Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

PROTECT-O-METAL

G. W. SMITH & SONS, INC. 5408 KEMP ROAD, DAYTON, O.

BETTER WELDING LOWER COSTS

W-AL-CO PRODUCTS



WALCO - DETROITER IMPROVED ELECTRODE HOLDER

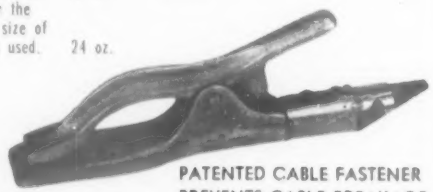
With the Streamlined Trigger

- Same rugged construction
- Double life reversible insulation
- Adjustable jaw tension
- Cooler handle
- Both jaws carry current from cable to rod

	Model	Rod Capacity	Amperage	Weight
Medium Duty	300 VRI	1/6 to 1/4	the lowest best suited for the type and size of electrode used.	20 oz.
Heavy Duty	400 VRI	1/6 to 5/16		24 oz.

WALCO GROUND CLAMP

AN A. H. J. WAGNER PRODUCT



PATENTED CABLE FASTENER PREVENTS CABLE BREAKAGE

All mechanical joints.

No solder—no weakness.

This is the Ground Clamp that keeps the work going steadily. No time out for repairs. No delays. No maintenance costs. Weak spots have been eliminated. A "must" where you want the best results.

WELDING ALLOYS MANUFACTURING CO.

Sales Office: 744 Broad St., NEWARK, N. J. Tel. MArket 3-2532

Plant: MALDEN 48, MASS.

Goggles

MADE of new lightweight plastic with an ultraviolet-ray inhibitor, goggles for weldors' helpers are said to overcome fogging, crazing and brittleness. Designed to be worn as flash goggles by such helpers or by spot weldors, the "No. 548-G" with round rubber headband and "No. 549-G" with flat elastic or rubber headband are also said to be excellent for outdoor use. They are large enough to be worn over prescription glasses and are made in green only.

CHICAGO EYE SHIELD CO., 2300 W. Warren Blvd., Chicago 12.

* * *

A-c, d-c welder

FLIP of a switch gives desired welding current on the "DA-200" arc welder. It is possible to change from one current to the other while welding to take advantage of characteristics best suited for the work.

A-c welding range is from 7 to 275 amp; on d-c it is 7 to 200 amp. Welder operates on 220/440 volts, 50/60 cycles, single phase. Equipped with "Dial-lectric control," which is said to provide instantaneous heat selection. For remote control, the radio-type dial may be taken to the work. Machine has no moving parts .

HARNISCHFEGER CORP., 4605 W. National Ave., Milwaukee 46.

* * *

Filing system

SAID to be the first of its kind, a filing system has been developed for welding supply distributors. "Master Welding Supply Index" and "Index" insert set provide means for organizing and systematizing distributor's catalog files. "Master Index" separates welding products into 16 groups, each of which is divided into classes with as many as 18 class divisions in a single group. The eight-page "Master" lists more than 350 welding products and may be bound in any standard catalog binder.

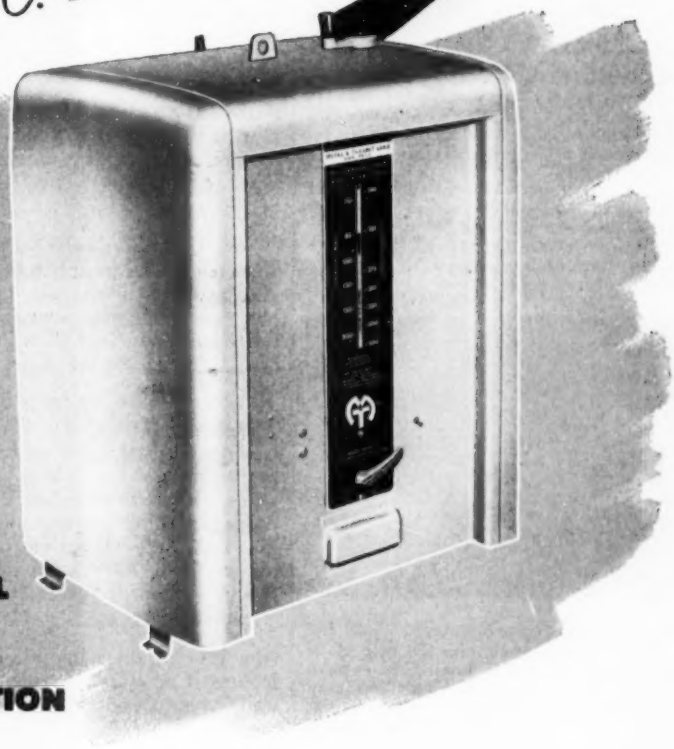
ASSOCIATED BUSINESS COUNSELORS, P. O. Box 112, Skokie 2, Ill.

* * *

GIVES me some kind of content to remember how painful it is sometimes to keep money, as well as to get it.—Samuel Pepys

For faster work at less cost—

M & T's New D.C. Rectifier Welder



INSTANT ARC

STABLE ARC

STEPLESS CURRENT CONTROL

SILICONE INSULATION

LESS WORKER FATIGUE

Your production is bound to increase when M & T's new DC Rectifier is on the job! Stable arc and instant reaction to changes in arc conditions mean stronger welds, fewer "patch-ups." There's no inductive time lag, either. Stepless current control, wide current range and absence of machine noise make for greater operator satisfaction and efficiency.

Maintenance is no problem whatever . . . Rectifiers and transformers are aircleaned by a reversible fan. There are no moving parts to wear out—the case can be removed for inspection easily, without disturbing primary lead. *Silicone insulation* protects against high temperatures, moisture, fumes and chemicals.

This 400 amp selenium rectifier is a standout in M & T's complete line of Welding Machines, Murex Electrodes and M & T Accessories. Write today for full information, or advice on any welding problem.

METAL & THERMIT CORPORATION 100 East 42nd Street, New York 17, N. Y.

MUREX ELECTRODES • ARC WELDERS • ACCESSORIES

Reducing a 12-day job to 2 days . . . with the ARCAIR TORCH

ARCAIR cut labor costs more than 80% on a recent job for Seidelhuber Iron & Bronze Works of Seattle, Wash., removing mild steel welds in one-sixth the time required with a chipper.

A change in requirements on three steel trash racks being built for McNary Dam left Seidelhuber with the job of removing 167 cross members on each rack. These cross pieces were triple welded with 4½ inch double fillet welds.

Two men with a chipper took three full days to strip one rack, plus the help of an extra man sharpening chisels. The remaining two racks were stripped by one man using an ARCAIR Torch. The job was completed in two days at a labor saving of 80 man-hours.

In addition to the time saved in actual removal of the welds, the job done by the ARCAIR Torch required far less grinding to prepare the surface for rewelding. The ARCAIR method slashed operating costs too . . . expenses amounted to $8 worth of electrodes plus the operation of a welding machine and air compressor.

Said the leadman on the job, "The ARCAIR Torch is faster than any other method I know of for leaving a smooth surface with little grinding. It's worth the expense even for one job."

Write for free bulletin with facts and photographs of time and money-saving applications of the Arcair Torch.

ARCAIR COMPANY
EASTERN DIVISION:
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Arcair TORCH
Cuts all metals—using only electric arc and compressed air

NEW PRODUCT BRIEFS

Portable ventilator can be used as a blower or exhauster. System is said to be compact, easily portable and have many applications in a variety of industries. MINE SAFETY APPLIANCES Co., 201 N. Braddock Ave., Pittsburgh.

* * *

Welding fitting, "WeldOlet" split tee, is designed especially for hot taps and new construction in oil and gas transmission industries. BONNEY FORGE & TOOL WORKS, Allentown, Pa.

* * *

Self-contained, portable, high-current testing instrument has built-in multirange ammeter and precision timer. MULTI-AMP CORP., 10 Third St., Newark, N. J.

* * *

Air vise is a heavy-duty unit for conventional holding with 6-in. jaw faces, plus removable pipe jaws located in lower portion of jaws. VAN PRODUCTS Co., 3736 W. 12th St., Erie, Pa.

* * *

Weighing only 45 lb, "Portaflux" is magnetic-particle test unit designed to locate surface defects in shop welds, rough castings, bar stock and forgings. NORTH AMERICAN PHILIPS Co., INC., Research & Control Instruments Div., 750 S. Fulton Ave., Mount Vernon, N. Y.

* * *

New type of adjustable air clamp is feature of air cylinder made of heavy wall brass tubing. Standard cylinder has 1-in. bore, 2½-in. stroke. SUMMIT TOOL & MFG. Co., 2907 Summit St., Toledo 11, O.

* * *

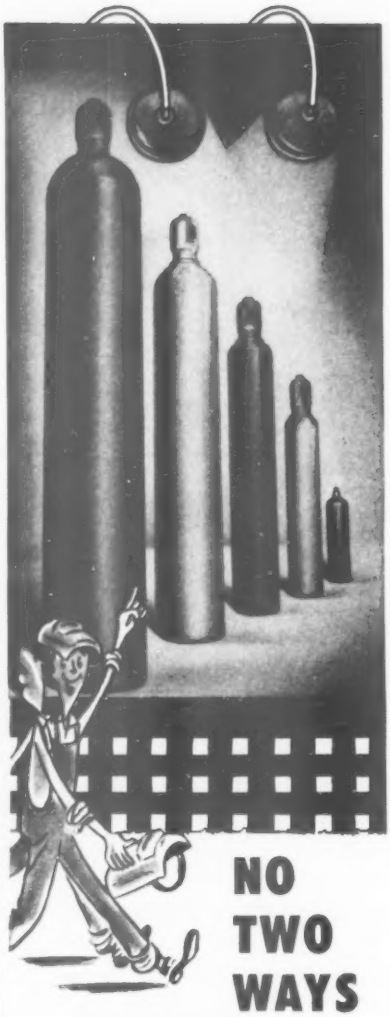
Intricate patterns in sheet metal can be cut with compact "Handy-Angle" saw, which can also be used on iron pipe and other materials. PRICE & RUTZEBECK Co., P. O. Box 30, Hayward, Calif.

* * *

Cleaning composition "No. 93" is for use in steam-generating equipment and steam guns where solution is siphoned from auxiliary tank. OAKITE PRODUCTS, INC., 157 Rector St., New York City 6.

* * *

Three models constitute new line of "Last Word" wheel dressers for surface grinders. Newest is "Model C" that tilts to more than 20 deg in either direction for wheel dressing in the tilted position. LAST WORD SALES Co., 18500 Mt. Elliott, Detroit 34.



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- QUALITY PRODUCTS—Harrisburg Steel manufactures top-quality cylinders in a complete range of sizes and capacities, from 14 to 400 cubic feet . . . in both Domestic and Export types . . . to I.C.C. specifications.
- TECHNICAL SERVICE—If you have problems concerning transportation of fixed or liquid gases, or any cylinder problem whatsoever, consult Harrisburg Steel. They have, or will find the answer.

Write today for a catalog and prices.

HSC-W-4/54

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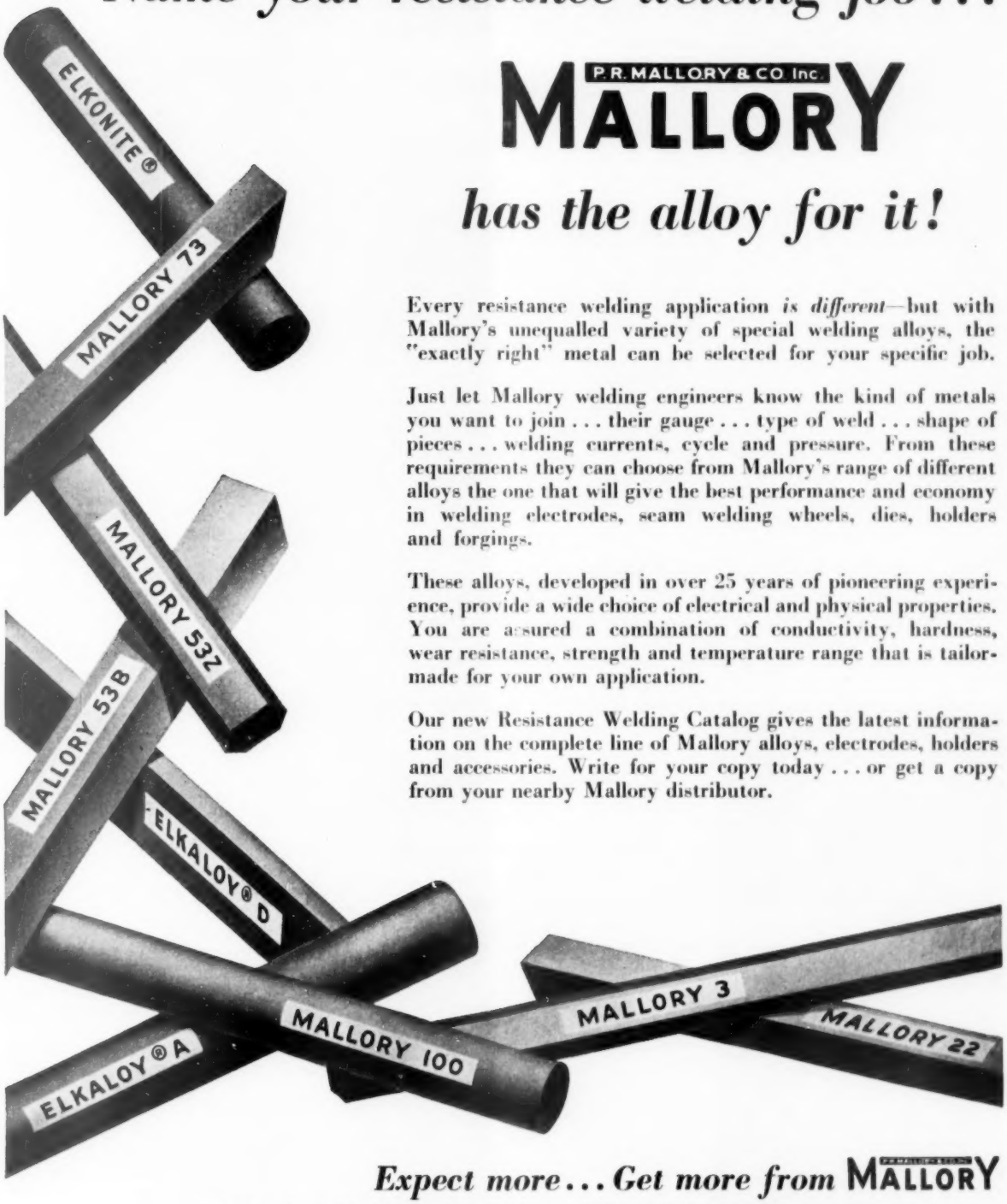
Harrisburg Steel CORPORATION

HARRISBURG 15, PENNSYLVANIA

Name your resistance welding job...



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has the alloy for it!

Every resistance welding application *is different*—but with Mallory's unequalled variety of special welding alloys, the "exactly right" metal can be selected for your specific job.

Just let Mallory welding engineers know the kind of metals you want to join . . . their gauge . . . type of weld . . . shape of pieces . . . welding currents, cycle and pressure. From these requirements they can choose from Mallory's range of different alloys the one that will give the best performance and economy in welding electrodes, seam welding wheels, dies, holders and forgings.

These alloys, developed in over 25 years of pioneering experience, provide a wide choice of electrical and physical properties. You are assured a combination of conductivity, hardness, wear resistance, strength and temperature range that is tailor-made for your own application.

Our new Resistance Welding Catalog gives the latest information on the complete line of Mallory alloys, electrodes, holders and accessories. Write for your copy today . . . or get a copy from your nearby Mallory distributor.

Expect more... Get more from MALLORY

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P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

REDUCE CYLINDER HANDLING

Up to 50% with INDEPENDENT Gas Supply Trailers!

Here's the newest idea in gas service! Leave a full gas trailer with your customer . . . replace it with another when empty. Reduces cylinder handling up to 50% . . . cuts cylinder costs . . . gives customers the convenience of having uninterrupted gas supply.

Many gas manufacturers and haulers of compressed gas (including many government agencies), are already enjoying the many advantages of INDEPENDENT Gas Supply Trailers.

Available for all gases as authorized by ICC.

INDEPENDENT ENGINEERING COMPANY, Inc.

CONSULTING · RESEARCH · DESIGNING

Manufacturers of CYLINDERS AND GAS PRODUCING EQUIPMENT ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

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We Invite Your Inquiries

FOR QUALITY WELDMENTS use Drawalloy CORPORATION

QUALITY CONTROLLED STAINLESS STEEL WELDING WIRE

▶ available in Spools, Coils and Lengths

▶ for Automatic and Semi-Automatic gas and inert arc welding

Welding wire by Drawalloy is made to an exacting high standard . . . a high standard established by long-experienced welding men who know welding wire and how it must work. Set-ups for automatic and semi-automatic welding take more time than regular welding. That's why you want to be sure of satisfaction *before* you start. This *reliable* wire is weld-tested to give the best results every time. Write today for complete information and prices.

WELDING SUPPLY DISTRIBUTORS: Get prompt delivery on all sizes and grades of stainless and tool steel wire for gas and inert arc welding.

Drawalloy CORPORATION

LINCOLN HIGHWAY AT ALLOY STREET • YORK 12, PENNSYLVANIA

Letters should be addressed to: The Editor, WELDING ENGINEER, 520 N. Michigan Ave., Chicago 11, Ill. No letter will be published unless signed, but your name will be withheld if you request it.

Permission granted

Dear Sir:

I have just read your excellent editorial "Anyone can give things away" in the April issue of WELDING ENGINEER. May we have your permission to quote a portion of this editorial in a future issue of our company publication, *Marketing Topics?*

Marketing Topics is sent to approximately 1,000 Airco personnel and dealers bi-monthly.

Thanking you, I am

Very truly yours,
W. G. Kleinhen
Dealer Sales Dept.
Air Reduction Sales Co.
New York City 17

* * *

Brazil gets permission, too

Dear Sir:

Our company in Brazil publishes a house organ entitled *O Soldador*, which is sent directly to the weldors of its customers. The editors have requested us to try and obtain permission from you to reprint the article, "Collision reveals true story of welded ship construction," which appeared on pages 24-25 of WELDING ENGINEER for November, 1953.

They would also like glossy prints of the photographs illustrating this article.

Sincerely,
Robert P. Pace
Publicity
International General Electric Co.
New York City 22

* * *

Praise from IAA

Dear Sir:

My sincere congratulations on your most excellent "Chicago: IAA" in the June issue of WELDING ENGINEER. It is a superb job. If I had it to do over, I would have asked permission

Largest Monel press roll ever built is fabricated by welding three 120° sections of plate together.

Sound from end to end

60 feet of welding in 2¾-inch-thick Monel shows "not the slightest evidence of porosity"

High speed paper mills pay a pretty penny for every minute of downtime. Yet, with an ordinary suction press roll, they have to ream thousands of holes and refinish the surface as often as every ninety days.

Right now several mills are operating Monel® rolls that have gone *more than three years without being touched.*

Welding a super press roll

Fortunately, fabrication of these super Monel press rolls presents no problem. Even in the case of giants like the one shown here, it's done simply and *soundly* with "130" Monel Electrodes.

This job was handled by the Youngstown Welding & Engineering Company. And it was a big job . . . *but literally!* Three 2¾-inch-thick by 38-inch-wide by 240-inch-long plates had to be joined to form the roll. Together they weighed nearly 12 tons.

700 lbs. of Electrode

The Youngstown people spent 500 hours welding this roll and used 700 lbs. of 3/16 inch diameter "130" Monel Electrodes for the three seams – 60 feet of 2¾-inch-thick weldment!

After each pass they made close inspection visually and with a flaw detection penetrant. A final check was made by machining the roll surface and boring a little less than half way through the welds at various spots.

No porosity

Youngstown reported this final check "did not reveal the slightest evidence of porosity." Welding with "130" Monel Electrodes had proved a highly satisfactory method of fabricating. The three welds are as strong as the parent metal and *just as corrosion-resisting* . . . that counts in the mills.

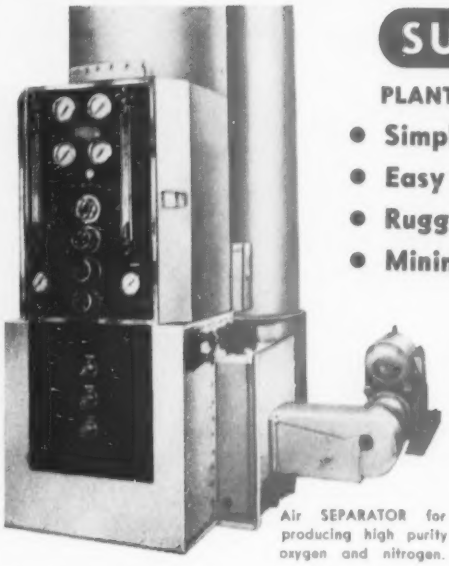
Maybe you have a welding job coming up, a job on Monel, Nickel or one of the other high nickel alloys. Use INCO Nickel Alloy Electrodes for best results. They're easy to work with. Write for the whole story in Technical Bulletin T-2, *Fusion Welding of Nickel and High Nickel Alloys.*

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

Joining nearly 12 tons of Monel to form this giant press roll took 500 hours of welding and 700 lbs. of Inco "130" Monel Electrodes.

INCO TRADE MARK **Welding Products**
Electrodes • Wires • Fluxes

Oxygen-Nitrogen from Air



Air SEPARATOR for producing high purity oxygen and nitrogen.

SUPAIRCO

PLANTS AND APPARATUS

- Simple to install
- Easy to operate
- Rugged construction
- Minimum maintenance

We have installations all over the world. Let us know your requirements. We will be glad to furnish detailed specifications and prices.

SUPERIOR AIR PRODUCTS CO.

130 Malvern St. Newark, N. J., USA

Also manufacturers of plants for producing liquid oxygen—liquid nitrogen—liquid air also Storage and Transport Containers for all liquefied gases.

If the Welding Job is MANGANESE STEEL

Whenever a job involves manganese steel, you'll get finest results from products made by Taylor-Wharton—oldest producers of this alloy and developers of TIMANG, the original manganese-nickel welding rod.

TIMANG assures easy, uniform, economical welding. It equals the parent manganese steel in hardness, ductility, strength and work-hardening properties. Air-toughening, needs no quenching. Available in 1/8", 5/32" and 3/4" dia., and lengths of 14" and 18", bare and coated.

See your welding supplier.

--the best Welding Rod is TIMANG®

Also Manganese Steel Welding Repair Shapes: Rounds, Squares, Flats, Plates, Grouser Bars, Repointers and Repoint Bars
Send for Bulletin #451

TAYLOR-WHARTON IRON & STEEL CO.
HIGH BRIDGE 8, NEW JERSEY
Cincinnati, O. Birmingham, Ala. Easton, Pa.

to attach a copy to each IAA News Bulletin rather than the shorter epilogue that we did send to all members.

You may be sure that we very much appreciate the excellent cooperation with IAA that you and WELDING ENGINEER have always given it.

Sincerely,
H. F. Reinhard
Secretary
International Acetylene Assn.
New York City 17

* * *

Not that we know of

Dear Sir:

We understand that a process is in operation in the United States whereby more than the normal amount of acetylene can be compressed into a cylinder than is possible with the usual porous mass and acetone as absorbant.

We shall be glad if you will supply us with any information relating to this process.

Thanking you in anticipation,
Yours faithfully,
W. H. Campbell
Chief Engineer
Saturn Industrial Gases Ltd.
London

Authorities we have asked do not know of such a process. One thought possibly you might be referring to the use of dimethyl formamide in place of acetone. While this chemical will dissolve more acetylene than acetone under equal conditions of atmospheric pressure and temperature, it is several times as costly. Although several companies have done experimental work with dimethyl formamide as an acetylene solvent in cylinders, we know of none that is using it.

* * *

Likes Mid-June issue

Dear Sir:

I write to tell that I like very much the WELDING ENGINEER *1954 Welding Guide and Product Directory*.

I am impressed by the great amount of useful information in it.

Sincerely,
H. C. Boardman
Chicago Bridge & Iron Co.
Chicago

* * *

Western Metal Congress in Los Angeles next year

NINTH Western Metal Congress and Exposition, sponsored by the American Society for Metals, will be held March 28-Apr. 1 in the Pan-Pacific Auditorium in Los Angeles.

Follow this line

to

New Savings

The OXWELD Automatic Tracer is an accurate, economical motive power unit for oxygen-cutting machines. It is easy to set up and operate. No special tools are needed for templet cutting—they can be cut from VINYLITE plastic sheets with a knife or shears.

With an OXWELD Automatic Tracer

Trade-Mark

MAKES OXYGEN-CUTTING FAST, EASY and ACCURATE

Fast, clean, and accurate—that's how parts produced by automatic tracer-guided cutting machines come off the production line . . . Whether the job is cutting a wide range of simple patterns or intricate shapes, hundreds at a time or one piece—the OXWELD Automatic Tracer reproduces all templet designs exactly, and economically.

No need to allow for kerf in the size of templets—you merely set a dial to compensate for the kerf width of the nozzle in use. Parts are reproduced to tolerances ranging from plus or minus 7/32-in. to 1/16-in.—clean and smooth, and at high speeds.

Simple to set up—no special tools are required for making templets, they can be cut from VINYLITE plastic sheets with a knife or shears . . . The templet is simply mounted on the tracing table with masking tape. Your LINDE representative will be glad to discuss your needs, and help you determine the best setups for your oxygen-cutting operations. Start saving now—call him today for more information.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Principal Cities

In Canada: DOMINION OXYGEN COMPANY
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The terms "Oxweld," "Linde," and "Vinylite" are registered trade-marks of Union Carbide and Carbon Corporation.

premium protection
priced right!

EYEGARD
IMPERIAL
GOGGLES

#502 CHIPPERS AND GRINDERS COVER GOGGLES, clear plastic, with perforated side shields

#500 WELDERS COVER GOGGLES with baffled side shields

★ Here are the goggles that all industry is acclaiming as providing the greatest combination of comfort and protection ever produced. "Imperials" are the finest, yet are priced to save you money. Six styles — cover-all and regular. Write now for literature and prices.

★ Uses standard 50 MM round lenses
★ 22% larger than ordinary goggles
★ More ventilation through cup slots — no fogging of lenses
★ Feather-weight aluminum rims and side shields
★ Face shaped contour to fit snugly, comfortably
★ Available with or without metal adjusting top bar

AMERICAN INDUSTRIAL SAFETY EQUIPMENT COMPANY
3503 LAKESIDE AVENUE CLEVELAND 14, OHIO
Division of The Burdett Oxygen Company, Cleveland, Ohio

"WE CUT REWORKS 94%
with DryRod Electrode Oven!"

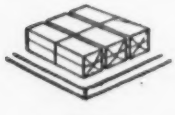
When 1 out of 3 welded hydraulic fittings were rejected at a leading Milwaukee machinery plant*, engineers blamed *moist electrodes*. Installing a low-cost DryRod Electrode Oven to store all unpackaged low-hydrogen rods, this company got *immediate* improvement . . . faster, better welds . . . few rejects. Their welding engineer said, *"DryRod successfully solved our welding porosity problem. With it we've been able to cut our reworks from 30 pieces to less than 2 per hundred!"*

Get your money's worth

You pay a premium for stainless steel, low-hydrogen, and other mineral-coated electrodes. Preserve that "baked-in" quality with DryRod Electrode Oven. Ask your welding supply dealer, or write direct for free folder.

*Name on request X-DR-12

Cut costs 4 ways with DryRod Method!



1 Store sealed cartons in warm, dry place.

2 Place unpackaged electrodes in DryRod Oven and withdraw as needed.

3 Locate DryRod as close to welding operations as possible.

4 For flexible, large-volume storage, stack ovens with compact DryRod Stands.

DryRod DIVISION OF Phoenix Products Co.
4715 N. 27TH ST. MILWAUKEE 16, WIS.

Weld Stresses

RESIDUAL STRESSES IN METAL AND METAL CONSTRUCTION. Edited by W. R. Osgood. Published by Reinhold Publishing Co., New York, 1954. Cloth, 6 by 9 in., 363 pages. Price $10.

This volume consists of 22 papers contributed by residual stress authorities throughout the world. They contain a wide range of information on the origin, distribution, magnitude, etc. of all types of residual stresses existing in structures or machines, whether arising from welding, machining or other causes. One of the papers included is "Residual Stresses in Welding," by William Spraragen. Several others deal with residual stresses in welded ships, making discussion of the subject with respect to welding fairly complete.

One of the most interesting papers is devoted to "Effects of Residual Stresses on the Behavior of Structures." In it there is pointed out the seriousness of residual stresses resulting from rolling and failures which have resulted from these stresses. It is interesting information for those who feel that welding is the source of all such stresses.

* * *

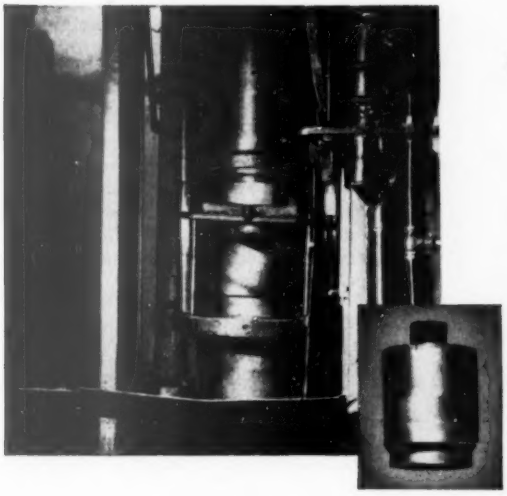
Structures

ELEMENTS OF STRUCTURAL ENGINEERING. By Ernest C. Harris. Published by Ronald Press Co., New York, 1954. Cloth, 6 by 9 in., 505 pages. Price $7.

Written as a text for mechanical, electrical and other non-civil engineering students, this book contains nothing on bridges or the original design of buildings. There are, however, examples of structural theory applied to such things as cranes and conveyor supports, as well as examples in which the effect of new electrical and mechanical equipment on the safety of existing buildings is analyzed.

While welding is touched upon briefly, this reviewer feels that the ever-increasing uses of structural welding, even in non-civil engineering fields, warranted a more thorough treatment of structural welding.

Look How You Save by Hard-Facing



PRODUCTION LIFE INCREASED 1000%

This hard-faced punch mandrel has produced 10,000 pipe couplings and still shows no sign of losing gage. Unprotected tool steel mandrels wore out after punching only 1000 pieces, and case-hardened mandrels punched only 500 pieces before they had to be replaced. A 3/16-in. layer of HAYNES STELLITE hard-facing alloy protects the mandrel from wear and galling.

SAVES $4000 PLUS

Rebuilding this worn extrusion screw with HAYNES STELLITE al'oy No. 1 cost $2000—$4000 less than a new screw would cost. And the rebuilt screw will give from 4 to 6 times more service than a new, unfaced screw. The screw is used to extrude rubber from a solid to a semi-liquid state. Wear is the chief problem, and it is effectively resisted by the hard-faced surfaces.

SHEAR 4 TIMES THE TONNAGE

These hard-faced blades shear an average of 200 tons of tough alloy billets. This is more than 4 times the average for special steel blades. Hard-facing with HASTELLOY alloy C protects the blades from wear, and they keep a keener cutting edge longer. When the blades finally do wear, they can be hard-faced again at a fraction of their replacement cost.

FREE—

Write for the 40-page "HAYNES Hard-Facing Manual."

HAYNES *alloys*

Trade-Mark

Hard-facing products made from cobalt-base alloys, nickel-base alloys, and tungsten carbide in the form of rod, wire, and coils.

"Haynes," "Haynes Stellite," "Hastelloy" are trade-marks of Union Carbide and Carbon Corporation.

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A Division of
Union Carbide and Carbon Corporation
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Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles—New York—San Francisco—Tulsa

BECKER

CARBON WELDER BRUSHES

for all types and makes of welding equipment

Everything you need from *one* source, with *one* responsibility. The fast, economical way to order. Catalog gives complete specifications, factory numbers, scaled drawings, etc. Write for your free copy today.

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Silver Brazing Alloy preforms for Production Brazing. Rings, Stamped or Coined Washers and Wire Forms

All inquiries given immediate attention and shipments made on short notice. Technical service men are available to assist you in proper joint design. Silvaloy brazing alloys also available in wire, strip, and powder from stocks in six branch warehouses.

1200 FLUX

Use when silver brazing Brass, Bronze, Copper, Nickel-Silver, Steel, Stainless Steel, Monel, Nickel, Inconel and other Nickel alloys. Furnished in ½ lb., 1 lb., 5 lb., 30 lb., and 65 lb. containers.

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3348 S. PULASKI ROAD • CHICAGO 23, ILLINOIS
PLANTS: DETROIT, ST. LOUIS, MILWAUKEE, MINNEAPOLIS, INDIANAPOLIS
OFFICES: KANSAS CITY, GRAND RAPIDS

NEWS . . . . . *from page 6*

tories and supporting shops and facilities. Today the plant value is $12,000,000. The Welding Laboratory was established in 1931. Here manufacturers submit equipment and materials for experiment and approval for use by the Navy.

A recent experiment that required a great deal of time was the shock testing of a large resistance welder. The welder had to withstand the impact of a heavy steel ball swung under its base. The metals first used cracked under the impact, but after considerable research, an aluminum base passed the test.

Among the events marking the anniversary was the presentation of testimonials to seven employees who had been with the station more than 35 years. Another testimonial, bearing the signatures of the Station's 1,000 employees, was presented to Captain Fred W. Walton, director of the installation, who retired from the Navy a few days later on June 30.

* * *

Germany's increased ship output credited to welding

WELDING technicians have said the fact that the few shipyards in West Germany turned out vessels totalling 725,000 tons in 1953 (against an average production of 250,000 tons produced by German yards before the war) was largely a result of progress in welding.

This was brought out at the recent Cutting and Welding Exhibition held in Essen, at which about 150 iron and steel firms demonstrated the progress of welding technology. Among the exhibits were welded high-pressure steam boilers, seamless welded parts of steel bridges, welded gas containers and ship sections.

—McGraw-Hill World News

* * *

Ford engineer wins NCG contest

EUGENE Tangert, engineer at Ford Motor Co.'s stamping plant, Buffalo, won the National Cylinder Gas Co. guessing contest held during the spring meeting of the American Welding Society at Buffalo. The contest entailed guessing the number of times a ball-peen hammer, operated by a variable-speed electric motor, hit the handle of a "Torchweld 45" medium-duty torch.

Mr. Tangert's guess was only two hammer blows short of the correct answer—69,212. His prize: a tool box containing a complete set of socket, open-end and box wrenches.

Name jury for Lincoln welding awards

THE award jury for the annual Engineering Undergraduate Award and Scholarship Program, sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, will consist of Dean James H. Sams, school of engineering, Clemson Agricultural College; Dr. E. E. Dreese, head of the department of electrical engineering, Ohio State University; and Professor Sidney Shore, school of civil engineering, University of Pennsylvania. Dr. Dreese will be jury chairman.

The jury will meet Aug. 16-27 in Alanson, Mich., to judge entries from engineering students throughout the country. Entries are mechanical or structural designs in which arc welding has been employed to improve the machinery or structures and reduce their cost. Top award is $1,250.

* * *

Calcium carbide plant opened at Pryor, Okla.

MIDWEST Carbide Corp. recently opened its new $3,000,000 calcium carbide plant just outside Pryor, Okla. The firm is owned jointly by Shawinigan Products Corp., New York City, and National Cylinder Gas Co., Chicago. The new operation will add about 45,000 tons of carbide to Midwest's total annual output.

On hand for the inaugural celebration were V. G. Bartram, president of Shawinigan Chemicals, L. F. Loutrel, president of Shawinigan Products, and Charles J. Haines, president of National Cylinder Gas. The open house luncheon was attended by 70 guests, including customers from 11 states.

* * *

Welding used to help "raise the roof"

To accommodate higher passenger equipment, the roof over the Chicago & North Western railway's train shed in Chicago is being raised by means of hydraulic jacks. The 270 steel pillars that hold the 81,000-ton steel and concrete roof are being flame-cut about a foot from the floor.

Steel sleeves are being welded to the bottom part of the pillars, with the top part left free until each is moved upward. They are able to be moved by jacks because heavy steel crosspieces are bolted to the upper portions of each pillar and a similar crosspiece to the sleeve. The jacks are fixed between these crosspieces, two to a pillar. When the roof has been inched to the foot-higher level, the upper portions of the pillars will be welded to the sleeve.

ANNOUNCING—

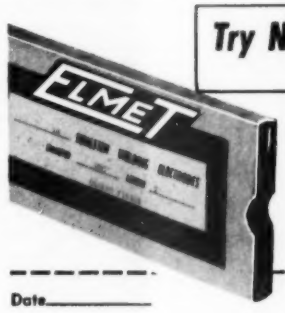
A NEW, Improved WELDING ELECTRODE by ELMET

—Pioneer Tungsten Producer

Here at last are pure and thoriated tungsten welding electrodes you can depend upon for uniformly superior performance. ELMET Efficiency Electrodes are manufactured by North American Philips, one of the pioneer tungsten producers with more than 20 years experience in this highly specialized field.

For purity, efficiency, reliability and perfect mechanical conditions, ELMET Tungsten Electrodes will meet your severest requirements. Their uniformity of properties, dimensions and characteristics prevent loss of time due to readjustments of equipment and voltage.

Rod diameters are held within specified diameters and limits of straightness, thus assuring good fit and uniform feed adjustment. Furnished in cleaned finish and centerless ground finish. Available in packages of 10 in all standard diameters from .040" to ¼" and from 3" to 18" in length. North American Philips Co., Inc., Elmet Division, Lewiston, Maine.



Try New ELMET Electrodes Now!
USE COUPON BELOW

Free Folder

Don't delay! Do it today! Send the coupon and get the facts about ELMET Efficiency Electrodes.

Distributor Inquiries Invited

Date_____

NORTH AMERICAN PHILIPS CO., INC.,
Box 1041A, Lewiston, Maine.

Please send me ☐ *Free Folder and*

☐ *Price on* _____ *Elmet Electrodes.*
(quantity, size, finish)

Name_____

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City_____ State_____

☐ *Send me your distributor proposal.*

for all 'round reliability

use ARCALOY

STAINLESS STEEL ELECTRODES . . .

highest quality for lowest welding costs

We know *this* about ARCALOY—Alloy Rods Company's experts work continuously to guarantee the all 'round reliability and cost-saving performance of these stainless steel electrodes.

Maintaining this reliability is a must with us. Arcaloy core wire must meet rigid standards. Coatings must be formulated with exacting care—must produce a slag that is easily and quickly removed. The entire production cycle is under closely controlled quality supervision. This alone produces Arcaloy electrodes that give uniformly excellent welding, day in and day out. This alone is your guarantee of highest quality for lowest welding costs.

Buy Arcaloy Stainless Steel Electrodes from your Alloy Rods Distributor today. They are available for all grades of chrome-nickel and straight chrome stainless steels with either AC-DC or lime coatings.

One of the many steps taken to guarantee the all 'round reliability of Arcaloy electrodes is pictured here. The inspection welder makes continuous checks for arc characteristics, slag removal and weld bead appearance.

OVEN FRESH! ARCALOY Electrodes are packaged in the familiar ALLOY RODS red-and-yellow hermetically sealed metal containers. Available in 1/16", 5/64", 3/32", 5/32", 3/16" and 1/4" diameters.

Alloy Rods Co.

General Offices and Plant • York 2, Penna.

Pacific Coast Sales Offices and Plant • El Segundo, Calif.

ARCALOY Stainless Steel Electrodes
BRONZE-ARC Bronze Electrodes
NICKEL-ARC Electrodes for Cast Iron
TOOL-ARC Electrodes for Tools and Dies
WEAR-ARC Hard-Facing Electrodes
WELD-ARC Low Hydrogen Electrodes
CUT-ARC Cutting Electrodes

no finer electrodes made . . . anywhere

Represented in Canada by: Canadian LIQUID AIR COMPANY, Limited BRANCHES, PLANTS, WAREHOUSES AND DEALERS, COAST TO COAST

European machine tool exhibit in Milan next month

FOURTH edition of the European Machine Tool Exhibition will be held Sept. 14-23 in Milan, Italy. The flags of 11 western European countries and the United States will fly over the exhibit. Tentative figures showed that casting machines, welding machine tools and accessories will be displayed on a wide scale. About 600 tons of such machines were booked to occupy some 56,000 sq ft of the total 390,000 sq ft. These figures are not final and may be modified by the time this appears.

The International Mechanical Engineering Congress has scheduled a conference for Sept. 24-25, immediately after the exhibition closes. It will be held at Stresa, where discussion will deal with "automation of measuring during machining."

—*McGraw-Hill World News*

* * *

Work toward electrode standardization

A PROGRAM for the standardization of welding electrodes purchased by the military is being sponsored by the Navy Dept. Two meetings have been held on the program, which will simplify military procurement. Where there have been four specifications for welding electrodes; eventually there will be but one.

Next on the agenda are rods used in oxyacetylene welding.

* * *

Cutler-Hammer moves two departments

NEW home of the advertising and business research departments of Cutler-Hammer, Inc., Milwaukee, is 226 E. Juneau Ave. Mailing address and phone number remain the same—315 N. 12th St., Broadway 1-7800.

* * *

Cincinnati Milling moves Los Angeles office

NEW address of the Los Angeles district office of Cincinnati Milling Products Division is 3018 E. Olympic Blvd. The firm, a division of The Cincinnati Milling Machine Co., Cincinnati, manufactures grinding wheels and cutting fluid.

* * *

AISC will hold 32nd annual convention in October

AMERICAN Institute of Steel Construction will hold its 32nd annual convention Oct. 25-28 at the Greenbrier, White Sulphur Springs, W. Va.

RWMA makes available film on stainless

RESISTANCE Welder Manufacturers' Association, Philadelphia, has added to its film library a copy of "The Resistance Welding of Stainless Steels," which was prepared by Allegheny Ludlum Steel Corp.

Available to schools, universities and plants for scheduled showings, the movie covers various types of equipment, proper handling of stainless steels prior to welding, different weld joints made, and precautions to be observed if the excellent properties of stainless are to be present in the finished product.

Running time for the 16-mm, color and sound film is 21 minutes. RMWA headquarters are at 1900 Arch St., Philadelphia 3, Pa.

* * *

New welding company formed in Connecticut

CONNECTICUT Welders, Inc., is the name of a new firm formed in Wallingford, Conn., by Clinton W. Swift, welding engineer. Mr. Swift in the past has been associated with Ampco Metal, Inc., Milwaukee, and The American Brass Co., Waterbury, Conn.

* * *

U. S. Steel Supply moves Newark warehouse

U. S. STEEL Supply Division of U. S. Steel Corp. has moved its reinforcing bar division from its old warehouse in Newark, N. J., to a new plant at 42-44 Lister Ave. in that city. The building area is about 55,000 sq ft.

* * *

Up in the air!

WELDORS take to the air to work on first unit of polymerization plant rising at site of new refinery plant of Standard Oil Co. of British Columbia. Plant is now under construction on the south shore of Burrard Inlet at North Burnaby, near Vancouver, B. C.

"If I were the boss, I'd order

NICKEL-ARC

for all cast iron welding"

No wonder the welder himself prefers Nickel-Arc electrodes for welding cast iron. Nickel-Arc has a low-penetrating, easy-to-control arc, with a smooth, steady metal transfer and good wash characteristics. And his Nickel-Arc welds are completely free of cracks or porosity.

But the boss has even *more* reasons for specifying Nickel-Arc. *Better machinability*, the result of the special core wire and coating of Nickel-Arc, cuts his machining cost, improves appearance. And the *confidence* of his welders in the finer performance of Nickel-Arc electrodes guarantees better workmanship on their part.

Standardize on Nickel-Arc, the electrode that is best for machineable welds in cast iron. Order Nickel-Arc from your nearby Alloy Rods Distributor or write the plant for information.

OVEN FRESH NICKEL-ARC Electrodes are packed in hermetically sealed metal containers in 3/16", 5/32", 1/8" and 5/32" diameters.

Alloy Rods Co.

General Offices and Plant • York 2, Pa.
Pacific Coast Sales Offices and Plant • El Segundo, Calif.

ARCALOY Stainless Steel Electrodes
BRONZE-ARC Bronze Electrodes
NICKEL-ARC Electrodes for Cast Iron
TOOL-ARC Electrodes for Tools and Dies
WEAR-ARC Hard-Facing Electrodes
WELD-ARC Low Hydrogen Electrodes
CUT-ARC Cutting Electrodes

no finer electrodes made . . . anywhere

Represented in Canada by: Canadian LIQUID AIR COMPANY, Limited BRANCHES, PLANTS, WAREHOUSES AND DEALERS, COAST TO COAST

WW ALLOYS, INC.

for the BEST in Resistance Welding....

ELECTRODES

KAPTRODES

HOLDERS

SEAM WELDING WHEELS

CASTINGS

FORGINGS

ROD and BAR STOCK

COLD FORMED OFFSET TIPS

The ALLOYS are right

WW Alloys are made under strict metallurgical control . . . are specifically suited to their function.

The DESIGN is right

Time-tested and field-proven, WW design is universally accepted—each unit is truly "job-engineered".

The DELIVERY is right

Thousands of items are carried in stock for shipment the same day order is received.

Ask for our New Catalog

WW ALLOYS, INC.

42803C

Division of Fansteel Metallurgical Corporation
11644 Cloverdale Ave. • Detroit 4, Michigan

JOSEPH W. ZVONE has been named vice-president, engineering and operations, of U. S. Steel Supply Division, U. S. Steel Corp., Chicago. He succeeds WILLIAM L. DAVIS, who retired after 48 years of service.

* * *

Irrgang

Lincoln

WILLIAM IRRGANG was named president and general manager of The Lincoln Electric Co., Cleveland, at the July 7 meeting of the board of directors. He succeeds JAMES F. LINCOLN, who had been president since 1929 and chief executive officer since 1914. Mr. Lincoln was elected chairman of the board and will remain active in direction of company policies. Mr. Irrgang, executive vice-president since October, 1951, becomes Lincoln's third president in its 59 years of existence. A native of Germany, he joined the firm in 1929.

* * *

ELMER W. SILVER, secretary-treasurer of Whitehead Metal Products Co., Inc., New York City, since 1942, has been elected a director of the company. EDWARD W. LOTHMAN, auditor, has been named secretary to succeed Mr. Silver, who continues as treasurer. Mr. Silver has been with the firm since 1916, Mr. Lothman since 1926.

* * *

LEROY Z. GIST recently became an authorized dealer for Air Reduction Sales Co. His firm—Greenville Oxygen Supply Co., Greenville, S. C.—will serve the South Carolina counties of Abbeville, Greenwood, Oconee, Pickens, Greenville, Spartanburg, Anderson, Laurens, Union and Cherokee. He formerly was with Columbia Oxygen Supply Co., Columbia, S. C.

BUY
SELL
USE

SHAWINIGAN CARBIDE

SHAWINIGAN PRODUCTS CORPORATION
EMPIRE STATE BUILDING
NEW YORK 1, N. Y.

"Red Head"
WELDING CLAMPS

• Designed for Welding •

No Threads To Damage

1. Case hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

2. The clamp body is cut from solid plate, thereby insuring extreme rigidity and giving great resistance to bending or twisting.

3. Heat treated chrome molybdenum alloy handle offers great resistance to bending.

23 stock sizes

CHICAGO BOILER COMPANY
1968 CLYBOURN AVENUE
CHICAGO 14, ILLINOIS

BERTRAM A. ROBBINS has been appointed sales manager of Unique Turntable & Equipment Corp., New York City manufacturer of welding positioners and turning rolls.

* * *

H. E. MARTIN, former New York district manager of The Babcock & Wilcox Co., has been elected president and a director of Metal & Thermit Corp., New York City. He had been with B&W since 1929. For many years a director of the American Society of Mechanical Engineers, Mr. Martin has served on its executive and finance committees. N. J. CONNOR succeeds him in the Babcock & Wilcox post. He had been assistant manager.

Martin

* * *

DR. GEORGE H. LEE, professor of mechanics at Rensselaer Polytechnic Institute, Troy, N. Y., has been made director of research succeeding the late DR. WENDELL F. HESS. Dr. Lee will retain his post as head of the department of mechanics for the time being.

* * *

SEMON H. STUPAKOFF, former president of Stupakoff Ceramic and Mfg. Co., Latrobe, Pa., has been elected vice-president of The Carborundum Co., Niagara Falls, N. Y. The ceramic firm was acquired by Carborundum early this year and was recently made a division.

* * *

KEN SOMERS, for 15 years a welding technician for Anti-Borax Compound Co., Inc., Ft. Wayne, Ind., has joined M. L. Weed & Co., Dallas welding distributor. Prior to going on the road for Anti-Borax, Mr. Sommers was a blacksmith-weldor for more than 25 years.

* * *

LEWIS E. KELLY and MERRITT S. BARNES have been appointed sales engineers for Balaam Brothers, Emeryville, Calif., distributor for Welding Products Division, A. O. Smith Corp., Milwaukee.

* * *

MORSE G. DIAL, president of Union Carbide & Carbon Corp., New York City, recently received the honorary degree of doctor of engineering from Stevens Institute of Technology, Hoboken, N. J.

DIAL SET LEVEL _____

MARK A CENTER LINE *at any angle*

DIAL SET 45°

TO ESTABLISH AND MARK a point at any degree of angle on shaft, pipe or tube without numerous calculations or "cut and try" methods use the Boyce Centering Head. It's a must for welders, machinists, pipe fitters and boilermakers because it is *absolutely accurate* and saves time. Small enough to fit in your pocket, it weighs only 9 ounces. Order yours today or write for information.

CONTOUR MARKER CORP.
1843 E. Compton Boulevard, Compton, California

MEASURE DECLIVITY

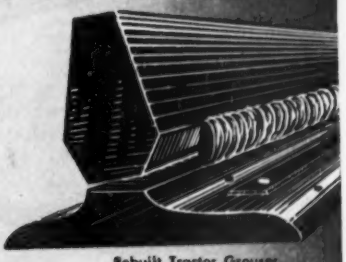
CHECK ANGLE BENDS

ESTABLISH BUTT-IN ANGLES

Boyce CENTERING HEAD

IT'S AMAZING... how much longer Tractor Shoes last when you--

REPAIR WORN
TRACTOR GROUSERS
with
MANGANAL
U.S. Patents 1,876,738—1,947,167—2,031,945
11%-13½% Manganese-Nickel Steel
SPECIAL SHAPE
APPLICATOR BARS



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Mill Depot Stocks: Newark • Wilkes Barre (Forty-Fort) Indianapolis • Chicago

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SOLE PRODUCERS 92 N. J. RAILROAD AVE. NEWARK, N. J.

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FLUXES

WE'VE GOT TIME ANYTIME TO TRY TO SOLVE YOUR PROBLEM

Welding people have been tossing problems to us for years now. We like it. And, we've successfully found good answers to so many of them that today we can offer you off the shelf:

The world's most complete line of alloys and fluxes for aluminum,

8 alloys and fluxes for work on cast iron,

12 for copper, brass, etc.,

8 for stainless steel,

12 for steel,

Many other alloys and fluxes for magnesium, nickel, zinc-base die cast, tinning, galvanizing, cutting, bevelling, and chamfering

Showed me how to join nichrome to copper.

Made me the world's strongest soft solder.

Gave me an electrode a beginner can use.

Showed me how to repair heat treated parts without spoiling the temper.

Chances are that we can give you your answer quickly.

Or, perhaps you can find it yourself in our 24-page Buyers Guide.

Want a copy? Ask...

ALL-STATE WELDING ALLOYS CO., INC.

249-55 FERRIS AVE., WHITE PLAINS, NEW YORK

DISTRIBUTORS EVERYWHERE

Newburn

McCandlish

S. H. NEWBURN has been appointed president of Air Reduction Canada Ltd. and will be located in the Montreal headquarters. He had been manager of Air Reduction Sales Co.'s North Central Region, with offices in Chicago. In that post he has been succeeded by D. F. MCCANDLISH, former manager of Air Reduction's district office in Chicago. Succeeding Mr. McCandlish is S. S. BRUCE, JR., former zone manager of the eastern region of Airco's railroad department.

* * *

DR. ERNEST F. NIPPES, JR., director of welding research, and DR. FRITZ V. LENEL, specialist in powder metallurgy, have been advance from associate to full professorships by Rensselaer Polytechnic Institute, Troy, N. Y.

* * *

FRANK K. MCDANEL, president of American Bridge Division, U. S. Steel Corp., retired June 30 after a 50-year career in building some of the world's largest bridges and highest skyscrapers. He has been succeeded by NORMAN B. OBBARD, former vice-president.

* * *

GEORGE L. STAUDT, advertising manager of Harnischfeger Corp., Milwaukee, was elected chairman of the board of the National Industrial Advertisers Association at its recent annual conference in Montreal.

* * *

Mallory - Sharon Titanium Corp., Niles, O., recently announced the following two personnel appointments in its service engineering group: ANDREW N. ESHMAN will be responsible for engineering service to customers relative to fabrication, metallurgy and processing of titanium sheet; L. M. GARY will be responsible for technical assistance to customers in the development and improvement of forging and fabricating techniques.

* * *

A. G. THOMPSON has been appointed by the British Welding Research Association to make an investigation into welding productivity.

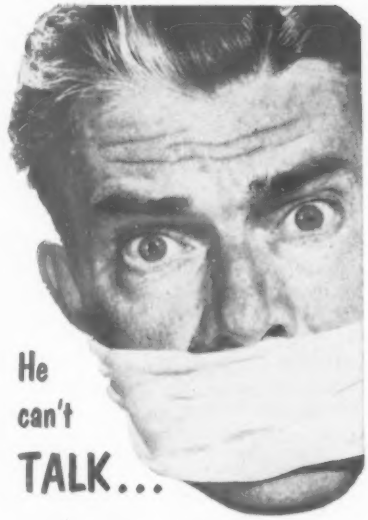
WAGNER
ELECTRODE HOLDERS

mean
— Engineering at its Best!
— Dependability, Economy, Safety!

- "STREAMLINE" — Low center of gravity trigger for quick one-hand rod release — saving time in production WELDING.
- HIGH HEAT RESISTANCE — Glass fiber insulation for Jaw covers give greater strength with longer life.
- WAGNERLOY — High Arc Resistant copper alloy used in tong members.
- CHANNEL CONSTRUCTION — In tong members for more rapid heat dissipation.
- SPRING TENSION ADJUSTMENT — for proper rod grip and ease of spring replacement.

WAGNER MFG. CO.
350 W. 1st SOUTH ST.
JACKSON, MISSOURI

Weld with Wagner



He can't TALK...

(So we'll say it for him.) The ingenious new SMITH'S "Flo-Trol" design eliminates back-fire and prevents burned-out valve seats in Smith's oxy-acetylene cutting torches. It's fool-proof. You can't go wrong.

Write us a card — we'll give you the facts.

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Make More Money on EVERY Welding Job..

METAL BOND
SOLDERING AND WELDING
PRODUCTS

We have been making Metal Bond Products for more than 25 years and successful Welders all over the country have been using them to advantage.

AIDS TO GOOD WELDING JOBS

● Tinning Compounds ● Soldering Salts ● Hard Metal ● Aluminum Solder ● Mouldough ● Brazing Flux No. 10 ● Special No. 31 ● Seal-X-O ● Cast Iron Welding Flux No. 4 ● All Steel Wire Brushes and Holders.

● Make your own test—also send for our pocket-size catalog which contains information and descriptions of our money-saving METAL BOND Products.

METAL BOND MFG. CO.
3201 KOSSUTH AVE.
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A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet."

• • • • • • • • • • • • • • •

McGraw-Hill Publishing Company, Room 2710, 330 West 42nd St., New York 36, N. Y.

FRANK L. LAQUE has been elected vice-president and manager of the Development and Research Division, The International Nickel Co., Inc. New York City. He succeeds THOMAS H. WICKENDEN, who retired as an officer but remains as a consultant. O. B. J. FRASER and DONALD J. REESE will serve as assistant managers of the division. A past president of the American Welding Society, Mr. Fraser in 1952 was awarded the Society's Samuel Wylie Miller Memorial Medal.

* * *

A. C. MONTEITH, vice-president in charge of engineering and research for Westinghouse Electric Corp., Pittsburgh, was elected president of the American Institute of Electrical Engineers at the group's annual summer meeting in Los Angeles. He took office the first of this month.

* * *

C. K. LOCKWOOD, vice-president of the Stainless Steel & Alloys Division, Shawinigan Chemicals Ltd., Montreal, was recently elected president of the Alloy Casting Institute. He succeeds G. A. BAKER, vice-president of Duriron Co., Inc., Dayton, O.

* * *

ELROY L. SIVERTSEN has been appointed salesman in the Los Angeles office of Cincinnati Milling Products Division, Cincinnati Milling and Grinding Machines, Inc., Cincinnati.

* * *

DALE B. KENNEDY has been named plant manager of Electricweld Tube Division of Jones & Laughlin Steel Corp., Oil City, Pa. He has been succeeded as general plant foreman by WILLIAM ROESCH. The changes follow the recent death of H. W. MASKREY, who had been general manager of the division.

* * *

Recent personnel changes announced by A. O. Smith Corp., Milwaukee: F. A. GRUETJEN has been appointed to the staff of PRESIDENT L. B. SMITH as director of aeronautical development; HARRIS MOYER succeeds him as head of the Propeller Division; RICHARD H. HEILMAN has been named general traffic manager of the corporation, filling the vacancy created by the recent death of ALFRED H. ZASTROW; WARREN HENDRICKSON has been appointed to the newly created post of general sales manager of the Process Equipment Division; ROBERT O. DEHLENDORF has been named assistant general sales manager of the Electric Motor Division.

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COMPLETE FACE PROTECTION AGAINST SPARKS AND FLYING PARTICLES

This Sellstrom No. 325 Dependon Face Shield has gained great popularity since its recent introduction as an addition to the Sellstrom line of Dependon Shields. It has a use in practically every industrial plant where there is an eye or face hazard. Here are a few of the outstanding features:

1. Completely covers and gives full protection to the face, eyes, ears, chin and forehead.
2. Genuine leather sweat band for utmost wearing comfort.
3. Patented Vulcoid adjustable head band to fit every head.
4. Large fibre top and formed bottom act as a single unit, being connected by sturdy fibre side pieces surrounding the cellulose acetate window.
5. Window is 6⅝" x 11¾". Your choice of .020, .040, or .060 clear or .020 green acetate.

Most dealers carry this No. 325 Sellstrom Dependon Shield in stock for immediate delivery. We urge that you give this shield an opportunity to render service to your workers. If you desire, write us for additional information or for a sample Face Shield on memo for examination purposes.

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MANUFACTURING COMPANY

Eye and Face Safeguards Designed for Utmost Comfort

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FREE

valuable help in improving welding results, cutting welding costs. From "America's Leading Institution Devoted To The Research and Manufacture of Specialized Metal-Joining Alloys."

Low Temperature EUTECTIC WELDING ALLOYS

TIS 2241
MANUAL OF DESIGN AND WELDING ENGINEERING. 20-page digest of most useful, popular book Eutectic ever offered. Basic welding "know-how." Valuable to engineers, foremen, weldors. Suggests new, profitable uses for welding. Shows successful designs possible with "non-fusion" welding. Covers steel welding, all metals. Hints on weld inspection and control.

TIS 1010
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TIS 800
TOOL & DIE SALVAGE MANUAL. 68 pages of effective tool and die welding and salvage recommendations. Includes basic welding procedures. Covers cast iron, kirksite and shoe or "clicker" dies. Has useful tempering chart and fully develops unique ability of "non-fusion" welding to eliminate damage to base metals. Special sections on new methods of production welding tools, producing forgeable welds. Hundreds of hints for cutting tool costs.

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Send me the following free welding helps —

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☐ Tell your local District Engineer to show me how Eutectic can make my welding "Better, Faster, Cheaper."

NAME_____

CO ADDRESS_____

CITY_____ STATE_____

RICHARD J. MCGINN has been named manager of Stud Welding Co., Inc., Houston, distributor of Nelson stud welding equipment and products in Texas, Oklahoma, Arkansas and western Louisiana. The firm also maintains factory branch warehouses in Houston and Dallas. Mr. McGinn had been field manager for Nelson Stud Welding Division, Lorain, O., in the Philadelphia territory. He is a member of the American Welding Society.

* * *

STANLEY C. AMREN has been named vice-president and general manager of Cleveland Welding Co., subsidiary of American Machine & Foundry Co., and DAVID S. MEIKLEJOHN has been appointed treasurer. The latter is a director and treasurer of the parent company. A. F. MELLMAN recently retired as the firm's executive vice-president and treasurer.

* * *

RAYMOND M. REBERT has been named chief chemist in charge of the chemical section of Norton Co.'s research and development department. He succeeds MARK O. LAMAR, who retired after 37 years with the Worcester, Mass., company.

* * *

RICHARD K. STEVENS was recently named industrial relations manager of the Chicago district of United States Steel Supply Division. He has been with U. S. Steel since 1950.

* * *

JAMES W. JONES has been appointed District Representative for The Cooper Alloy Foundry Co., Hillside, N. J. His territory will cover the states of Tennessee, Alabama, Georgia, Mississippi and Florida.

* * *

Following personnel changes were recently announced by American Wheelabrator & Equipment Corp., Mishawaka, Ind.: WILLIAM A. ILLSLEY was promoted to district sales engineer in the Detroit office; W. J. SUTHERLAND was named to a similar position in the Springfield, Mass., office; JOHN H. BURLINGAME was appointed to the Springfield office as service engineer; in Cleveland, C. J. OSBORN was promoted to district sales engineer, and DEAN T. POURNARAS was named district service engineer; JOHN J. SAVIGNAC was appointed district service engineer in Milwaukee; in Mishawaka, ROBERT E. GALLATIN was appointed district sales engineer, and HAROLD GROH was made district service engineer, succeeding BRUCE BERGER, who was promoted to the home office's engineering department.

IT TAKES TWO

DISPLAY ADVERTISING

- **AROUSES INTEREST**
- **CREATES PREFERENCE**

DIRECT MAIL

- **GETS PERSONAL ATTENTION**
- **TRIGGERS ACTION**

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Please forward my free copy of the McGraw-Hill "Industrial Direct Mail Catalogue."

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30 YEARS AGO

(Taken from THE WELDING ENGINEER *of August, 1924)*

WELDING in plumbing and heating is the subject of an article in this issue. Author is H. W. Wetzell, of The Smith and Oby Co., Cleveland.

—30 YEARS AGO—

APPLICATION of metal arc welding to ship construction is described in this issue by James W. Owens, electrical engineer, Norfolk Navy Yard. Mr. Owens is in charge of welding research for the Bureau of Construction and Repair, U. S. Navy.

—30 YEARS AGO—

A CHEMICAL discussion of cutting cast iron by oxyacetylene is included in this issue. Author is J. Fitzgibbons.

—30 YEARS AGO—

IN celebration of its fifth anniversary, the American Welding Society will publish its first membership directory this month.

—30 YEARS AGO—

REDUCING the limitations placed upon welding is urged in the lead editorial this month. (The industry is still plagued with unnecessary restrictions, and WELDING ENGINEER continues to editorialize against them.)

—30 YEARS AGO—

SEVEN warships—all with histories antedating the Spanish-American War—are undergoing conversion to peacetime craft on the Pacific Coast. Oxyhydrogen torches are being used to dismantle the big 10- and 12-in. guns.

—30 YEARS AGO—

J. A. DITTMAR, of Southern Welding & Machine Co. sailed for Europe this month. There he will study new methods of the oxyacetylene welding process.

—30 YEARS AGO—

WESTINGHOUSE Electric & Mfg. Co. will enlarge its Mansfield, Ohio, works by erection of two steel buildings—one four stories, the other one story.

—30 YEARS AGO—

NEW firm in New York City, the Siemund-Seneca Arc Welder Corp., will manufacture welding equipment. Incorporators are W. C. Steiger, W. J. Metzger and W. Hedley.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

FOR WELDING AND CUTTING...

IN THE RED DRUM

HIGHEST QUALITY

DUST-FREE

NATIONAL CARBIDE

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National Carbide Company

GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK 17, N. Y.

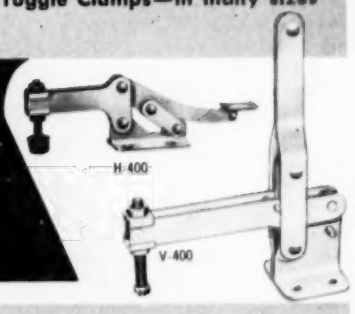
A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED

TOGGLE CLAMPS With added valuable feature —now offered to you as part of the broad line of KNU-VISE Toggle Clamps—in many sizes and types.

they're **NON-CORROSIVE!**

they're **NON-MAGNETIC!**

they're of **STAINLESS STEEL!**

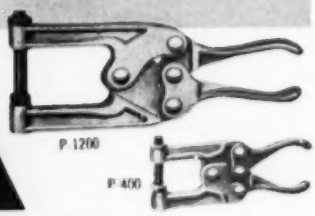


TOGGLE PLIERS Here is the KNU-VISE answer to your need for a portable clamp to eliminate the headaches in spot welding aluminum.

they're **NON-MAGNETIC!**

they're **NON-CORROSIVE!**

they're of **K-MONEL!** (stronger than steel)



Both the clamps and pliers are also available in aluminum, on special request

Sales offices in principal cities—Teletype DE 49

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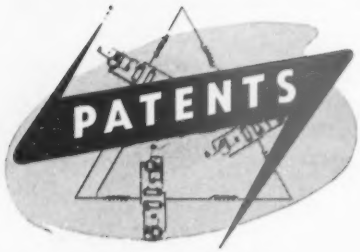
LAPEER MANUFACTURING CO.

3042 DAVISON ROAD, LAPEER, MICHIGAN

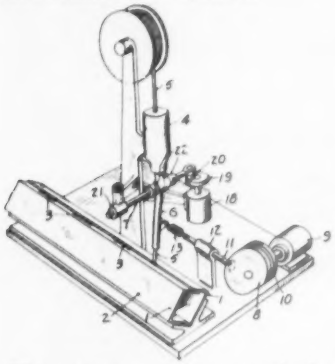
WESTERN DIVISION 422 MAGNOLIA, GLENDALE, CALIFORNIA

CANADIAN DIVISION HIGGINSON ENGR., HAMILTON, ONTARIO



Electrode Motion

2,665,363. GEORGE R. WEPFER, Milwaukee. Assigned to A. O. Smith Corp., Milwaukee. Filed May 26, 1951. Granted Jan. 5, 1954.



This patent concerns a method of making a short arc weld along a predetermined line of welding. The arc is struck between the electrode and the start of the line on the work. It is maintained in the vicinity of this point long enough to permit deposition of a substantial amount of metal. The electrode is then moved to a second point on the line, but no metal is deposited during the movement. This second point is at a relatively cool part of the workpiece. The electrode is then moved back along the welding line until the first deposit is reached. The return travel is at a speed relative to the work. This effects the deposit of weld metal which, with the first deposit, provides a crater-free continuous bead of metal between the two points.

* * *

Resistance welding

2,666,835. ALBERT J. ELLEMAN, London. Assigned to Imperial Chemical Industries Ltd. Filed July 24, 1951. Granted Jan. 19, 1954.

This patent covers a process for resistance welding of metals parts that have a dry protective coat. The electrical resistance of the coating is reduced by incorporating into the coating composition an intimate admixture of non-oxidized magnetic metal powder. The coated metal parts are pressed together to provide a contact area, through which is passed an electric current.

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GRADUATE, B.S. in E.E., Age 31, 13 years in Welding Industry. Served as Welding Eng., Chief Inspector, and Chief Tool Engineer. Desires responsible supervisory position, Eastern or Midwestern location. Resume upon request. PW-3374, Welding Engineer.

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WELDING—A profitable trade Demand for trained men. Learn quickly at best equipped school in U.S. Non-profit. G.I. approved. Catalog free. Write Hobart Welding School, Box U-741, Troy, Ohio.

BUSINESS OPPORTUNITIES

Welding & Steel Fabrication shop near San Bernardino, Calif., on Highway 99. Modern steel shop bldg. 60' x 70' also attractive 2 bedroom house. Price $13,500.00—$4000.00 down payment and balance on terms. Write to J. R. Gebbie, Rt. 1, Box 278, Loma Linda, Calif. Ph. 63151.

For Sale 25% interest in Welding Supply Business fully established and operating located in South Florida. Good location, good lines equipment and gases, $3,300.00. BO-3334, Welding Engineer.

For Sale 25% interest in Oxygen & Acetylene Manufacturing Plant located in Southwest, or entire plant might be purchased. Now operating very successful BO-3336, Welding Engineer.

MONTGOMERY ENGINEERING CO.
SAVE up to 1/2
• SALES
• RENTALS
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WELDERS

WELDING RODS

We offer for prompt acceptance, subject to prior sale, 15,000 lbs. of Standard make Welding Rods, 3/16" x 36", in original unopened boxes, at large savings over manufacturers selling price. Here is a real bargain for prompt acceptance.

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1-10 KVA BUTT WELDER

Will take .040 to .1875 in dia., Semi-automatically controlled, productive at rate of 1 thousand pieces per hour on small dia. Machine, carries new guarantee 90 days.

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OXYGEN ACETYLENE REGULATORS

Have been reconditioned, overhauled, painted, tested and guaranteed 100% to your satisfaction. **$8.90 each,** freight prepaid. If they don't meet with your approval for any reason return freight collect.

ATLANTIC WELDING SUPPLY
2700 West 3rd Street, Chester, Penna.

WELDING ENGINEER

Excellent opportunity for man with engineering degree, experienced in metallurgy and welding, with particular reference to resistance welding of aluminum. Must be ready for supervisory responsibilities. Permanent position, salary commensurate with experience and ability.

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Mr. Howard Squires, Manager
Production Engineering, Telephone Division
STROMBERG-CARLSON COMPANY
Rochester 3, New York

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JOBBERS WANTED IN EVERY CITY TO SELL "WELDER'S PAL" EYE DROPS

On the market for 19 years.

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Yes, that's right, we repair all makes of Regulators, cutting and welding equipment for dealers. The pricing is handled on a minimum and a maximum, pre-arranged. Some repair parts, especially the type equipment you handle, can be purchased as reasonable as we can. So if you care, you can send the repair parts to us and we will only charge for installation. Freight or parcel post is a fifty-fifty split. Write for full details today. You'll really be surprised. Let us be your repair station. Prompt service.

ATLANTIC WELDING SUPPLY
2700 West 3rd Street
Chester, Pennsylvania

ARC WELDERS

G.E., 400 Amp., Model 6WD34C2, 220/440/3/60, excellent condition. Price, f.o.b. Cleveland, Ohio, $225.00 each

WEBER MACHINERY CO.
8200 Bessemer Ave., Cleveland 27, Ohio

OXYGEN PLANT

200,000 cu. ft. or 10 tons per day high purity, operated until March 1, 1954 consisting of, 2 oxygen compressors, driers, gas holder, pressure banks, etc., also trailers, tractor, buildings and land. All in excellent condition.

DELTA OXYGEN COMPANY
Sparrows Point, Baltimore 19, Md.

SPECIAL BARGAIN

No. 14 two conductor neoprene rubber sheated portable cord. Can be used for direct burial. New, in 100 ft. lengths, 10c ft., 250 ft. lengths or over, 8c ft. 2% cash discount. Write to:

M. C. SOLON
407 East Superior St., Duluth 2, Minn.

SAVE UP TO 40%
WELDING-RODS AND WIRE

Coated - Bare - Coil - All National Brands. Prime Condition. 1-16" to 5-16" Original Containers.

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ALL OR PART AT CLOSEOUT PRICES
SEND FOR LISTING NOW!

40,000 lbs. Welding Electrodes (Stainless, Aluminum, Bronze, Monel). Many types and sizes. Excellent Condition.

1,000 lbs. Low Fuming Bronze Rod, 3/32" to 3/16".

20,000 pieces RESISTANCE WELDING ELECTRODES, NEW, many types, standards.

Large Lot NEW Welder's Aprons, Gloves, Jackets, Capes, Tips, Lenses, etc.

6—G.E. Atomic Hydrogen Arc Welding Transformers, #6WK20A.

10—Taylor-Winfield Seam and Spot Welders, Types: SLB, MSL, WB, MSC—25 to 150 KVA.

LESCO PRODUCTS COMPANY
4205 FULLERTON, DETROIT 38
TEXAS 4-6532

WESTINGHOUSE FLEX ARC AC WELDERS

Type C 500 Amp.
Type C 400 Amp.
Type HC-C 200 Amp.

UNIONMELT WELDING HEADS
OXWELD SHAPE CUTTING MACHINES

LAKESIDE MACHINERY
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